1945

Chemical Industries

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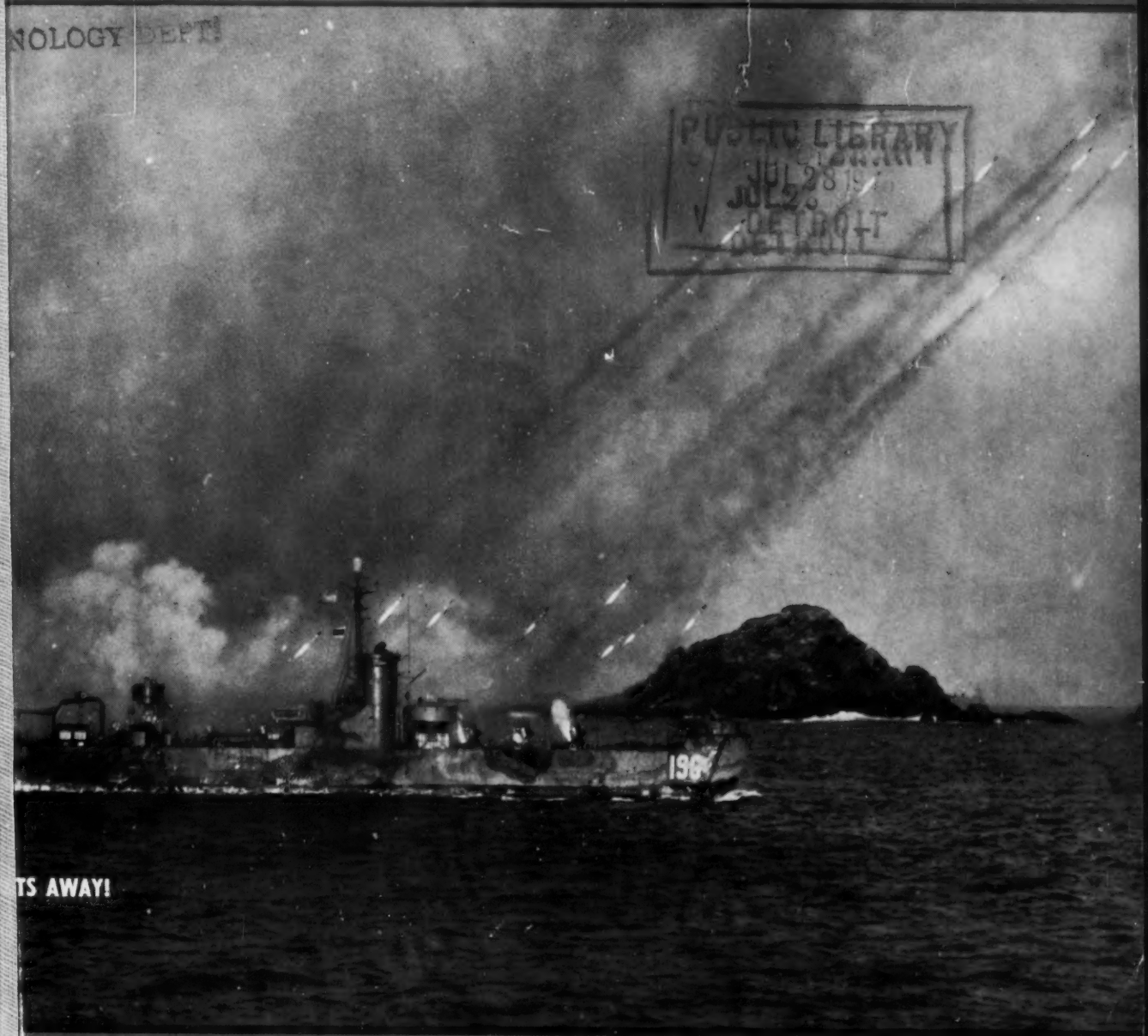

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The Chemical Story Behind U. S. ROCKETPOWER p. 65

VR v. 57 July-Dec. 1945

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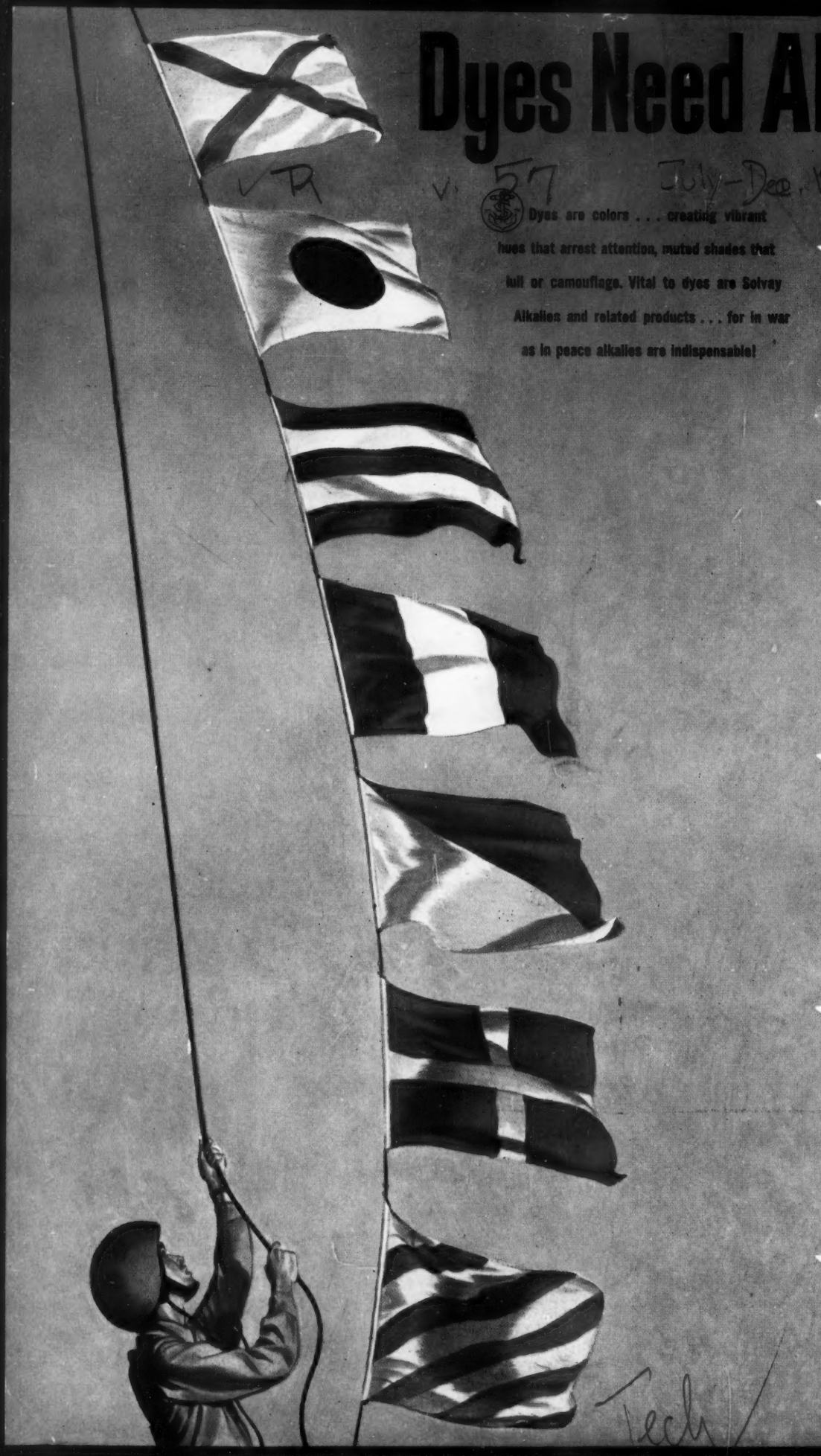

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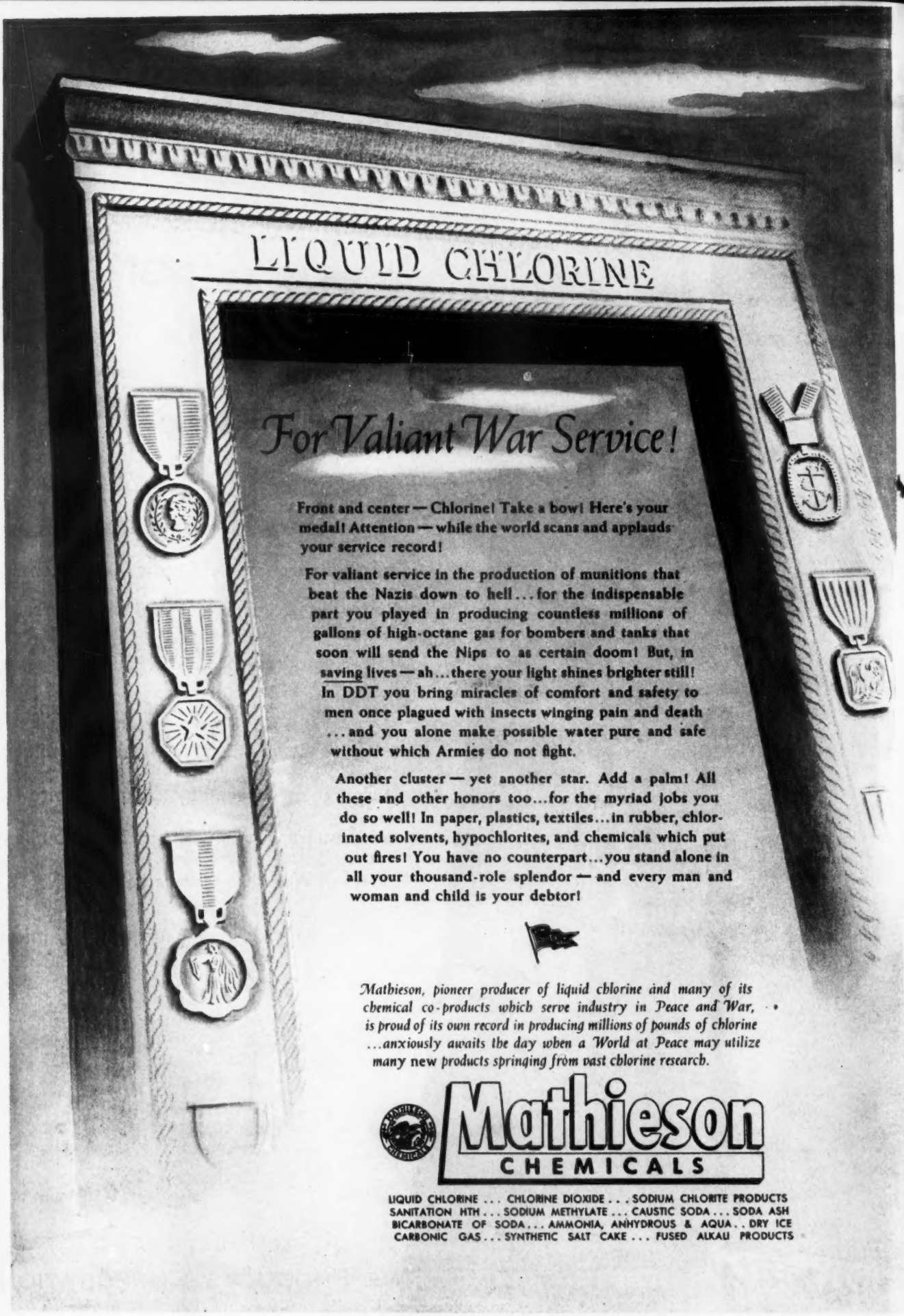

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THE CHEMICAL BUSINESS MAGAZINE

Chemical Industries

VOLUME 57
NUMBER 1

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COVER: Volleys of destructive rockets fly from a U. S. Navy LSM (R), Landing Ship Mechanized (Rockets), off Okinawa. Official U. S. Navy photo.

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ABOUT THE AUTHORS

HENRY N. MARSH, author of this month's feature article on rocket propellants, page 65, is manager of smokeless powder operations for Hercules Powder Co., a job which keeps him literally up in the air much of the time flying between far-flung explosives operations from coast to coast.

Mr. Marsh has been closely associated with America's World War II munitions program. His career started in 1917, when he joined Hercules upon graduation from the University of Kentucky with a degree in industrial chemistry. From 1918 to 1930 he was assistant to the chemical director of Hercules, after which he became assistant to the director of operations of the explosives department. In 1939 he was made manager of smokeless powder operations. A lieutenant colonel in the Ordnance reserve, Mr. Marsh resigned his commission in 1942 at the direction of the Chief of Ordnance in order to devote his full time to every phase of the nation-wide munitions production program.

Mr. Marsh is the author of numerous technical articles on the manufacture of explosives and has been issued six United States patents and one British patent in the propellants field. He is a member of the Army Ordnance Association, Reserve Officers Association, American Institute of Chemical Engineers, and a life member and director of the National Rifle Association.

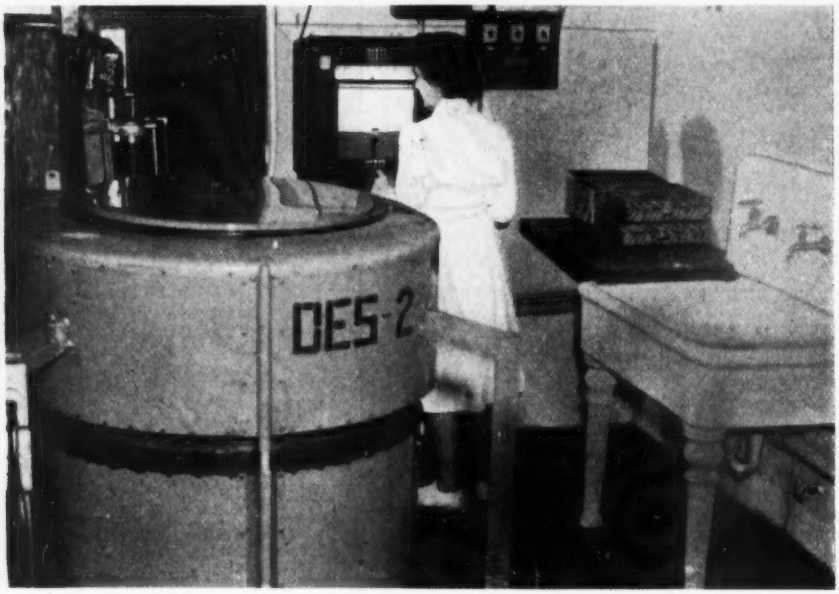
R. L. "MIKE" CAIN, who writes in this issue on Sales Control, hails from Sheffield, Pa. He attended Allegheny College at Meadville, Pa., and New York University. His early ambition — never achieved — was to become a lawyer. Instead, ever since college days, he has found himself almost continuously engaged in sales work of one kind or another.

Mr. Cain's special interest in sales control grew out of an experience of ten years ago. He had sent his sales manager a schedule of a proposed trip through Ontario. The preceding trip through this territory had been a complete flop, so his boss immediately dispatched a letter advising against the journey. For some unknown reason the letter was delayed, and Mr. Cain left on the scheduled date. As it turned out, the trip was unusually successful. Finding the letter awaiting him on his return, he was struck by the need for a more effective home office control of his own and other field salesmen's efforts. Today, after a number of years spent in active study and administration of sales control work, Mr. Cain says his interest has reached what might be termed the "professional hobby" stage.

Mr. Cain received his early business experience in the paper and book binding fields. He joined Westvaco Chlorine Products Co. in 1936 where he was in charge of the New York district sales staff and was divisional sales manager of Curtin-Howe Corp., an affiliated company. In August 1942 he became assistant to the director of sales for Pennsylvania Salt Manufacturing Co.

HOLGER C. ANDERSON, whose article on high vacuum techniques appears on page 83, attended college at Northwestern University. Moving to Harvard for graduate work, he earned his doctorate in 1942 in physical chemistry, his thesis being on the subject of reaction kinetic measurement of carbon-hydrogen bond strengths. At Distillation Products,

(*please turn to page 173*)



Blood plasma desiccator and its Micromax Temperature Recorder, Michael Reese Research Foundation, Chicago

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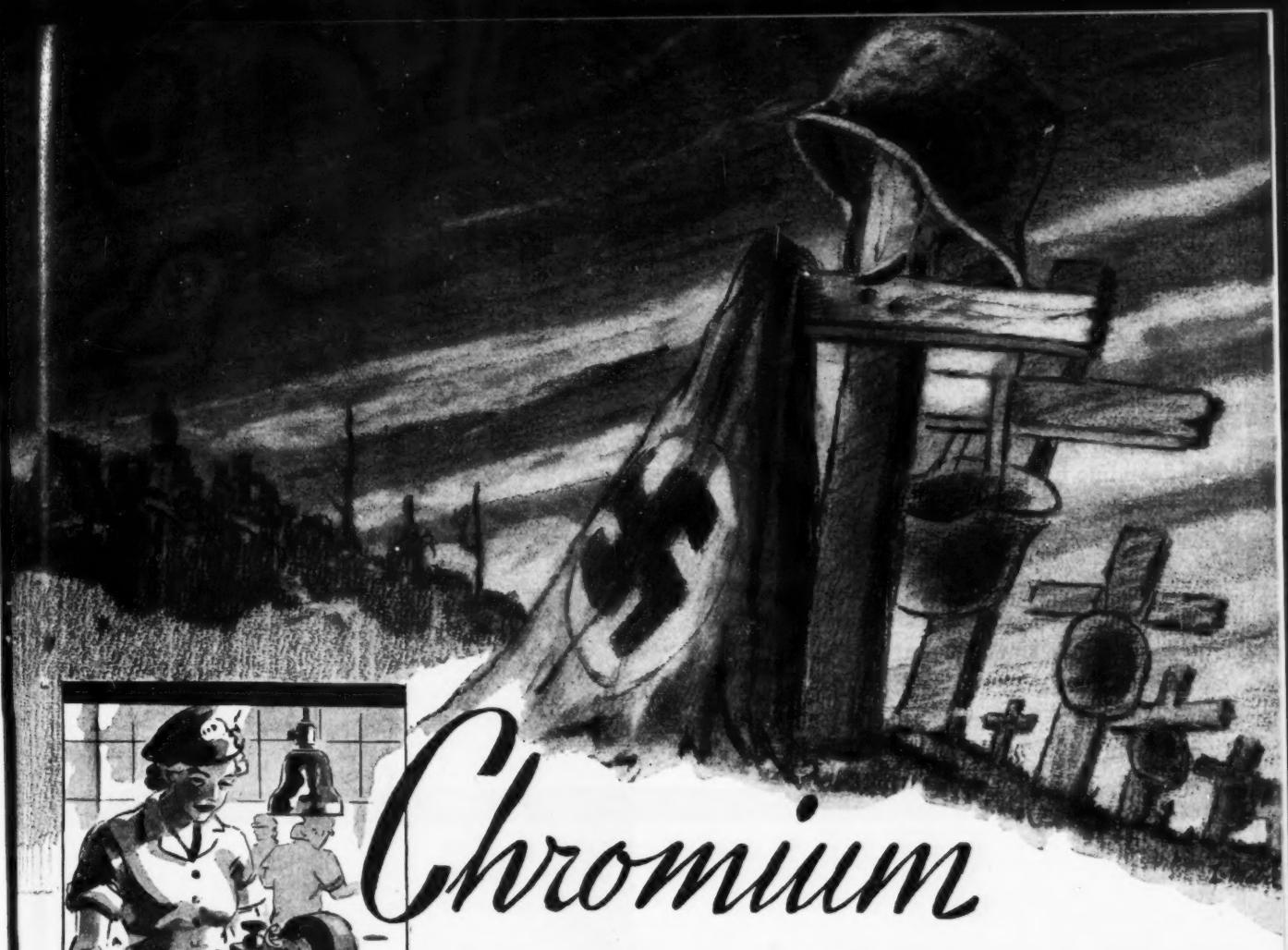

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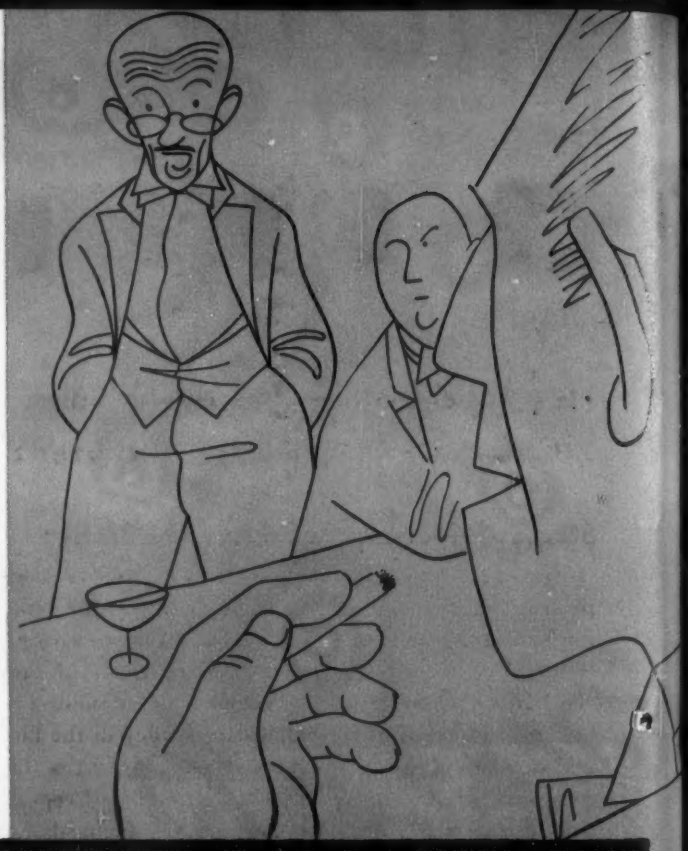
Caustic Comments



famous author-humorist had finished an after-dinner peech. The next speaker, an attorney, rose, shoved is hands deep into his pockets, as was his habit, and aughingly remarked, "Doesn't it seem a little unusual hat a professional humorist should have to try so hard be funny?"

rawled the humorist in a caustic manner, "And oesn't it seem a little unusual that a lawyer should ave his hands in his *own* pockets?"

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WASHINGTON

T. N. SANDIFER *reporting*

New Label System . . . Boykin Bill . . . Plant Disposal I. C. C. Rate Change . . . Fertilizer Bill

Standard Chemical Label System Drafted

COMPLETION OF WHAT IS DESCRIBED as the first comprehensive effort to systematize and standardize labeling of hazardous chemicals, has been announced here by the Manufacturing Chemists' Association. A special labels and precautionary information committee of the Association, after an exhaustive survey of the field and detailed study of previous labeling practices, has completed a manual entitled "A Guide for the Preparation of Warning Labels for Hazardous Chemicals."

One of the principal aims, it is stated by Association Secretary Warren Watson, "is to discourage depending upon code labels which leave the user with no information about the product."

The manual outlines the principles that should govern preparation of precautionary labels, with maximum emphasis on protecting the users, handlers, repackers, jobbers and distributors of chemical products, or others who may be less familiar with them than the manufacturers.

Disposal of Plants in Dispute

GOVERNMENT AND PRIVATE INDUSTRY SPOKESMEN failed last month to see in unison disposal ideas involving surplus Government aluminum plants. Federal power executives, both in the Pacific Northwest and elsewhere, are concerned over the obvious curtailment of outlets for this huge power surplus once war production ends and Government aluminum facilities shut down on their power needs. They want to see the plants' futures assured now.

These Government officials have recommended a "hard, fast and definite program immediately." Private business spokesmen feel however, that it would be unwise to lay down at this time a hard and fast procedure for plant disposal in aluminum production. Postponement of adoption of any definite program has been urged from this quarter.

The Government men are entirely frank in their interest. TVA spokesmen point out that cancellations of war contracts by both Alcoa and Reynolds Metals, have been deep enough to reduce TVA revenues by $6,000,000, and as one official said, "This loss of revenue we would like to avoid."

Pacific northwest Government power likewise is anxious to find what its normal loads will be. Admittedly in the west there is a surplus of such power for peacetime industries as of prewar consumption.

Boykin Bill

IMPORTANT REVISION of the bill as presently drawn, to facilitate detection of violations of the anti-trust laws, and to head off abuses of contracts under patents, has been suggested in reference to the Boykin bill by Assistant Patent Commissioner C. C. Henry. This bill, it may be recalled, would require registration of licenses and patent agreements in international operations.

Assistant Commissioner Henry, testifying on the bill before the House Patents Committee, recommended that the measure require registration of contracts between American concerns and foreign interests, wherever such agreements limit the use of patents in this country.

Action should seek to prevent abuse of contracts under operation of patents, he said, without burdening the large majority of small corporations owning most of the patents involved and utilizing their patent rights in a lawful manner. He suggested a further penalty in the bill for any violation of the anti-trust laws.

Decentralization Speeded By Freight Rate Changes

A NEW ASPECT OF THE POSTWAR TREND in industry is developed by the recent southern freight rate decision of the Interstate Commerce Commission. Seemingly a regional matter, Northern and Eastern business and industry elements are showing concern over a possible hastening of decentralization of their industries, already diffused by war needs.

War programs have brought not only new plants, but technical skills, into juxtaposition with the natural raw material supplies and labor resources of the areas most benefited by the rate change—the South, Southwest, West and some Midwestern areas. According to informed analysis, the industrial sections of the Middle West—Ohio, Indiana, Illinois, Michigan, Wisconsin, and parts of Kentucky, Pennsylvania and Minnesota—may find industries inclined to break away

from larger centers, towards less populous sections of the states.

The potentialities of presently Government-owned war plants, whose disposition is still a matter of fluid policy, are a decidedly cogent factor in this general outlook.

Fertilizer Bill Provides National Industry

LEGISLATION TO ESTABLISH a national fertilizer policy has been introduced in S. 882 by Senators Hill and Bankhead of Alabama. The bill compromises differences between the agencies previously at loggerheads as to control and formulation of such a policy—Tennessee Valley Authority, Agriculture Department, Interior, etc., but itself would establish a national program that appears to have been drafted in very sweeping terms.

Title III of this Act authorizes the Government to undertake immediate construction of fertilizer manufacturing plants, to furnish fertilizer to be used in national test demonstrations, conducted under State agriculture colleges. It provides for a TVA plant at Mobile, Ala., to manufacture phosphate fertilizer and fertilizer materials. It further provides for construction of facilities to produce or process by-products resulting from operation of the Mobile plant, to lower costs of this plant and thus enable it to operate on a more efficient basis.

TVA is authorized to purchase or lease sufficient phosphate lands in Florida to supply both the Mobile plant and Muscle Shoals with raw materials for at least 50 years.

Interior is authorized to make leases from public lands in Florida, to TVA, and this department is further empowered to construct two plants designed to utilize Western potash and phosphate deposits.

Due to the condition of the legislative calendar and the summer recess of Congress now contemplated, this bill is not likely to get detailed consideration in the near future. However, as it is viewed by some industry observers, the measure provides a very accessible bridge from government fertilizer production to broader ventures in industrial chemistry. From this angle, as they see it, the bill has very important possibilities for postwar consideration, worth industry study.

New Manpower Demands Seen

THE DECISION OF SELECTIVE SERVICE to reduce or eliminate largely the drafting of men over 30 for military service after June is expected to throw renewed pressure on deferred groups of younger men now in industry. A very considerable number of men in the ages 26-30 have been certified for reclassification, including men previously deferred pending the training of a replacement. Word has gone out that little attention will be given to pleas for further deferment after June 30, on the ground that replacements have not been trained or obtained, indicating that industry committees concerned will have to extend themselves in protecting key men whose deferment is sought under these conditions.

Use of Cotton and Other Products in Road Building

SENATOR LANGER, N. DAK., HAS INTRODUCED a resolution providing for a Senate inquiry designed to learn the extent to which cotton products and by-products, and synthetic rubber made from waste products, are used in road building, with a view to expanding such uses.

Synthetic Rubber Compounds Studied by Bureau of Standards

FOR RESEARCH ON SYNTHETIC RUBBER it is important to have a wide range of data on properties of the chemical compounds used. The Bureau of Standards has had a research program under way for several years, it has now reported, as a result of which two of its staff, Russell B. Scott and Jane W. Mellors, have determined among other things the specific heats of the vapors of four compounds: 1,3-butadiene, isobutene, styrene, and ethylbenzene.

American Research Aiding Brazilian Rubber Development

BRAZILIAN AUTHORITIES HAVE REQUESTED the Department of State to continue during this summer the collaboration with Brazilian research institutions on rubber production which has been in progress for the past several years, during which time Dr. Norman Gekkedahl has been on loan from the Bureau of Standards. Under the plan now being considered, this consultant would spend two additional months in Brazil on this work.

With another technician, Frederick L. Downs, American Steel and Wire Co., Worcester, Mass., also on loan, Dr. Bekkedahl purchased for the Brazilian government all apparatus and machinery for a rubber laboratory, installed and put this equipment in operation, and for a two-year period has trained Brazilian scientists in the operation of this laboratory.

The rubber laboratory is currently in operation, testing many samples of various types of rubber and conducting research on methods of processing the rubber from the latex. The return of the American advisor would be for the purpose of orienting the future research program of the laboratory, and installing additional equipment developed in the United States in the past three years.

The Brazilian arrangement was entered into, it is recalled, at a time when the U. S. rubber supply was cast very much in doubt by far eastern developments. It was realized that after the war Brazilian wild rubber would have little competitive chance with the far eastern product and with the newly developed American synthetic industry, unless plantations can be successfully established in Brazil.

Source of "Firsts"

Modern Research Laboratory at Niagara Plant as interpreted by the artist, John Gaydos

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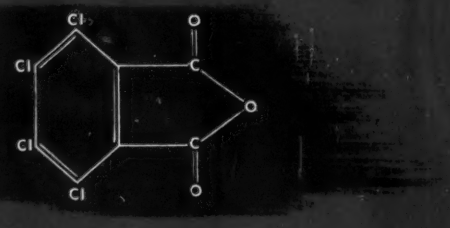

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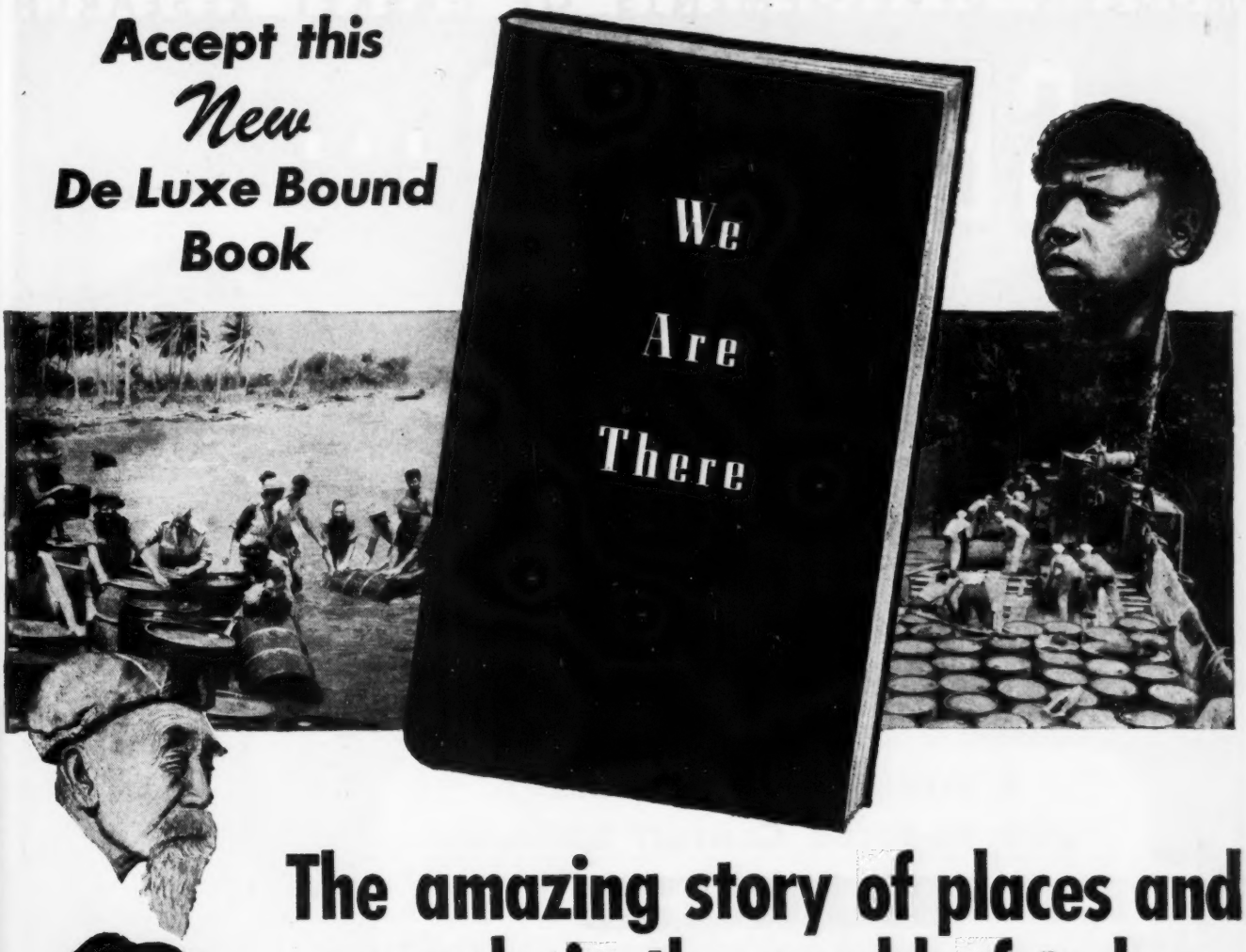

The amazing story of places and people in the world of today

"WE ARE THERE" takes you on a stirring and kaleidoscopic journey to the countries that are the stage for the tremendous drama of our era. The reader visits Britain, France, Holland, Russia, the Balkans, South Africa, India, China, the Southwest Pacific and the Philippines, to meet world leaders, heroic peoples, and courageous "natives."

The book is profusely illustrated with original drawings and portraits by the author, Mr. T. H. Chamberlain, who has travelled extensively, both as an aviator and as a writer and artist. It contains portraits of world leaders and generals of the United Nations, as well as pencil studies of natives of the Philippines, Bali, India, Holland, Burma, the Solomons and China.

A section of the book contains a reprint of "We Were There," a modern odyssey of history-making adventures, in response to many requests for a second printing. Copies of the first edition were sent to every state in the Union, and to practically every country in the world.

"We Are There" has been prepared as a souvenir gift to our friends in the industry. A copy of the De Luxe Edition, beautifully bound, will be sent free upon request. Just mail the coupon.

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For services requiring an all-metal gasket with high unit gasket stress at moderate bolt loads—the Goetze Serrated Gasket is ideal. Growing in popularity for sealing joints in high pressure steam, process equipment and piping, this gasket is supplied in a wide range of materials and with serrations of a pitch designed to meet individual requirements of specific operating conditions.

An excellent example of advanced Gasket Engineering, this type is literally custom-built to meet the specifications of each use. The Serrated Gasket is another illustration of Goetze mechanical and metallurgical research that is producing the many modern developments in Gasket Engineering about which you will want to know.

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Now available to employee groups, technical societies, engineering schools and other organizations throughout the country, this new 35-minute Kodachrome film, "Only a Gasket," tells why these are the "Biggest little things" in modern Industry. Write for full information.

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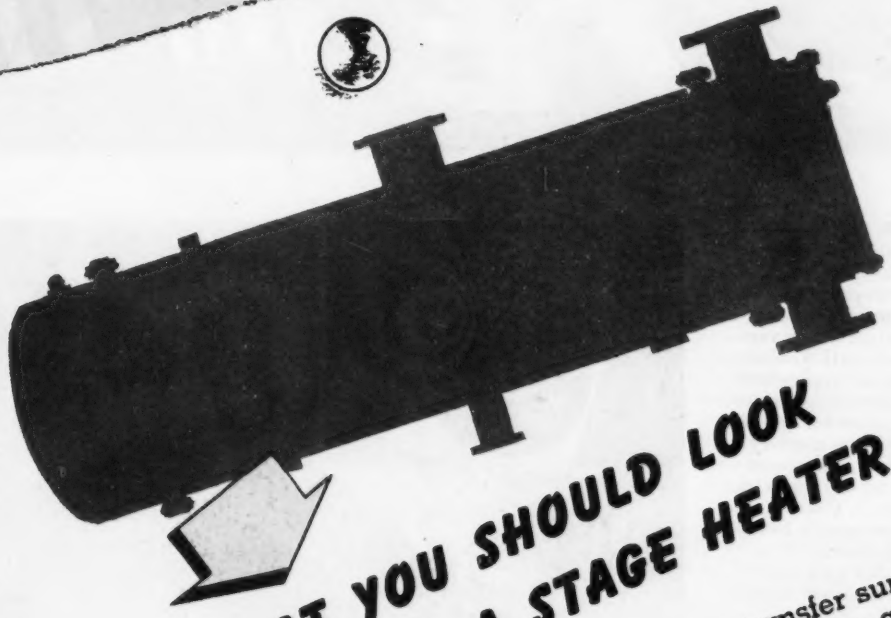

WHAT YOU SHOULD LOOK FOR IN A STAGE HEATER

ONE OF A SERIES OF ADVERTISEMENTS DESCRIBING THE MANY TYPES OF G-R HEAT TRANSFER APPARATUS

In addition to the proper amount of heat transfer surface, a stage heater must have several features of design and construction to assure and maintain satisfactory operation and service.

Some of these features are:

Positive prevention of leakage at water heads.
Free expansion and contraction of tubes.
Ample support of tubes to prevent sagging and vibration.
Effective baffling of steam and air.
Utmost simplicity combined with sturdiness.
Convenience of access and ease of maintaining tightness of gasketed joints.

All these, and other advantageous features . . . many of them exclusive . . . are provided in the various types of G-R Stage Heaters for high, moderate and low pressures. Our Bulletin 277 describes these units in detail and explains how G-R Stage Heaters assure exceptional heating effectiveness, trouble-free service, and economical maintenance. Your copy of this informative bulletin will be sent on request.

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Evaporators
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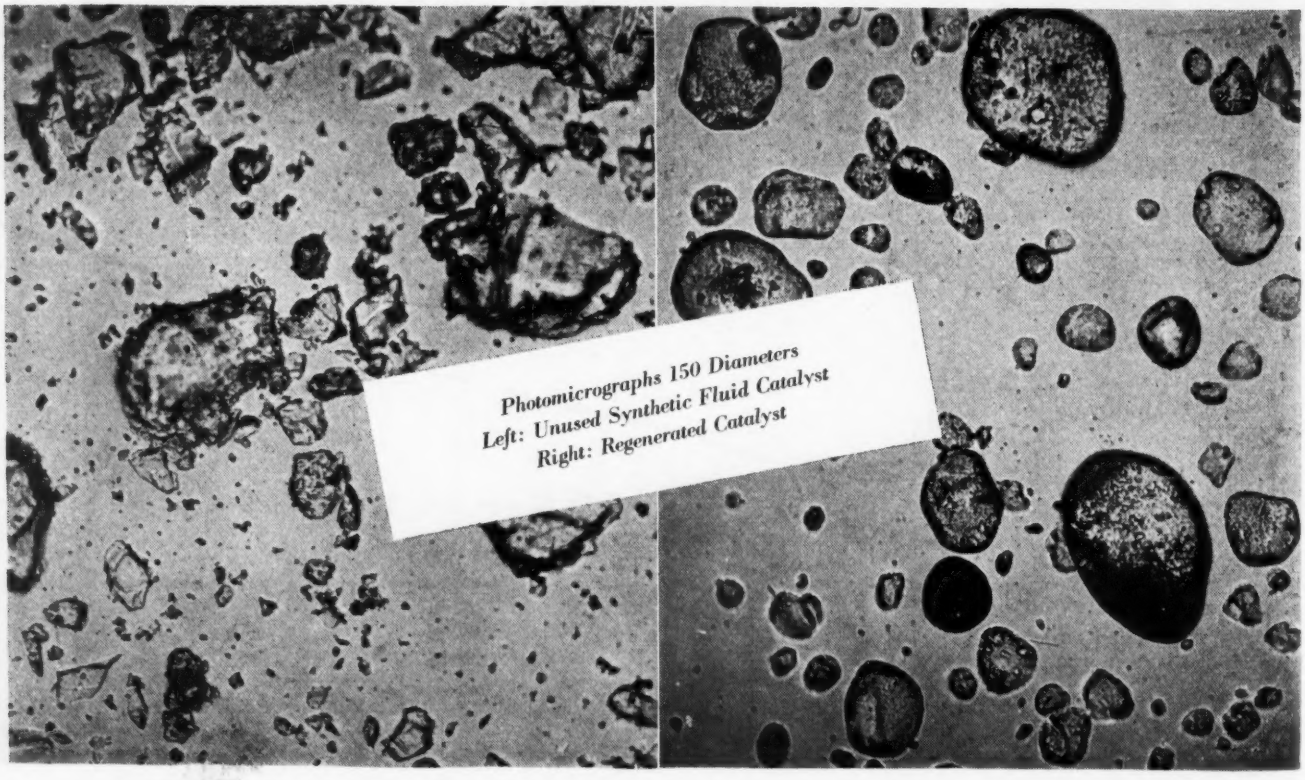
THE GRISCOM-RUSSELL CO.
285 Madison Ave., New York 17, N. Y.

GRISCOM-RUSSELL
Pioneers in Heat Transfer Apparatus

LIFE On The

(*Right*) **ANT-EATER . . . MODERN STYLE!** Of the 750 kinds of ants found in this country alone, many are industriously destructive pests which must be destroyed and controlled. Big black carpenter ants damage timber and shade trees. A leaf-cutting variety defoliates trees and vegetation. Common garden varieties found everywhere raise "herds" of aphids which damage farm and garden crops. But nature's ant-eaters, one of which is shown above are scarcely a practical threat to the menace. An economical and practical method of dealing with ants in lawns and gardens is CYANOGAS* Ant Killer, product of Cyanamid's Insecticide Department. Placed directly in ant nests, the powder in one 30¢ package releases enough gas to "kill a million ants."

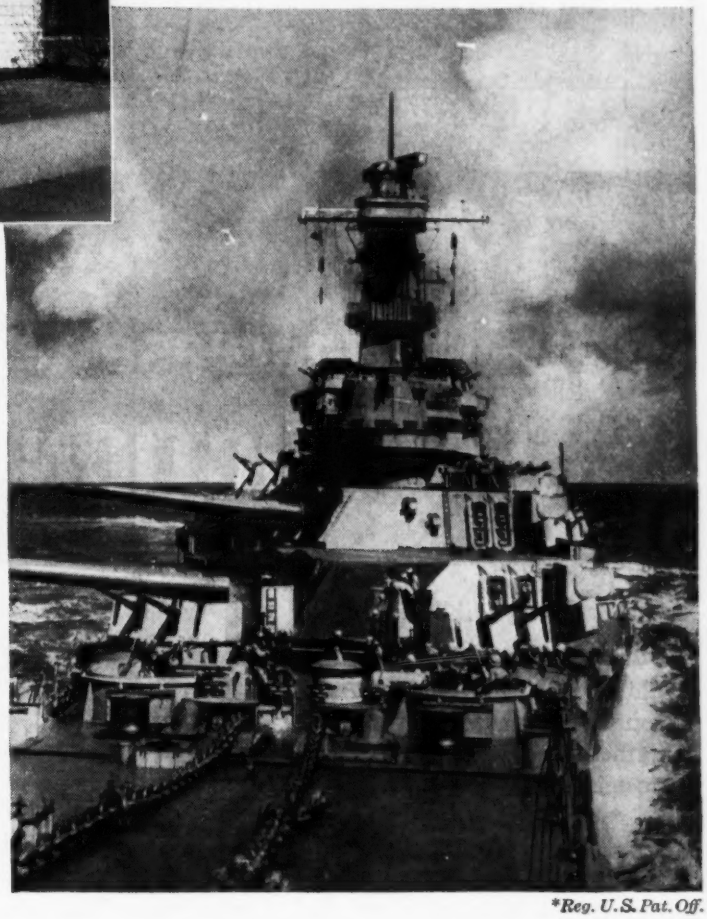
(*Below*) **RUGGED "CATS"**—Structure of synthetic fluid cracking catalysts which have played a vital role in high-octane gasoline production is revealed in a series of photomicrographs made as part of continuing studies on catalysts at Cyanamid's research laboratories. In the one on the left, note the sharp, angular, crystalline character of a fresh catalyst, and also the extremely fine particles which should be saved in dust recovery equipment if losses are to be held at a minimum. On the right, note rugged strength of regenerated catalyst particles and some of the "fines" saved.



Photomicrographs 150 Diameters
Left: Unused Synthetic Fluid Catalyst
Right: Regenerated Catalyst

Chemical Newsfront

(*Left and below*) **FOR USE AT HOME AND ON THE HIGH SEAS,** superior surface coatings are being formulated with Cyanamid's REZYL* resins. These well-known phthalic alkyd resins meet Army and Navy specifications, and are famous for their fast drying quality and extreme durability. Other famous Cyanamid synthetic resins—TEGLAC*, BEETLE*, MELMAC*, and PHENAC**—are also available to meet post-war demands for the formulation of protective and decorative surface coatings with more permanent beautiful color, greater hiding power, faster baking, improved hardness and mar-proofness, and better water, heat and chemical resistance.



(*Below*) **NEW ALL-THROUGH WHITE LEATHER** that will not darken with age or exposure to sunlight, is highly resistant to heat and oxidation, and is improved in texture, fullness, and wearing qualities, is made possible with TANAK* MR melamine resin developed by Cyanamid for leather tanning. TANAK MR also assures improved qualities in leathers other than white for luggage, handbags, coats and jackets, upholstery, belts, and gloves.

**Trade-Mark

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American Cyanamid & Chemical Corporation

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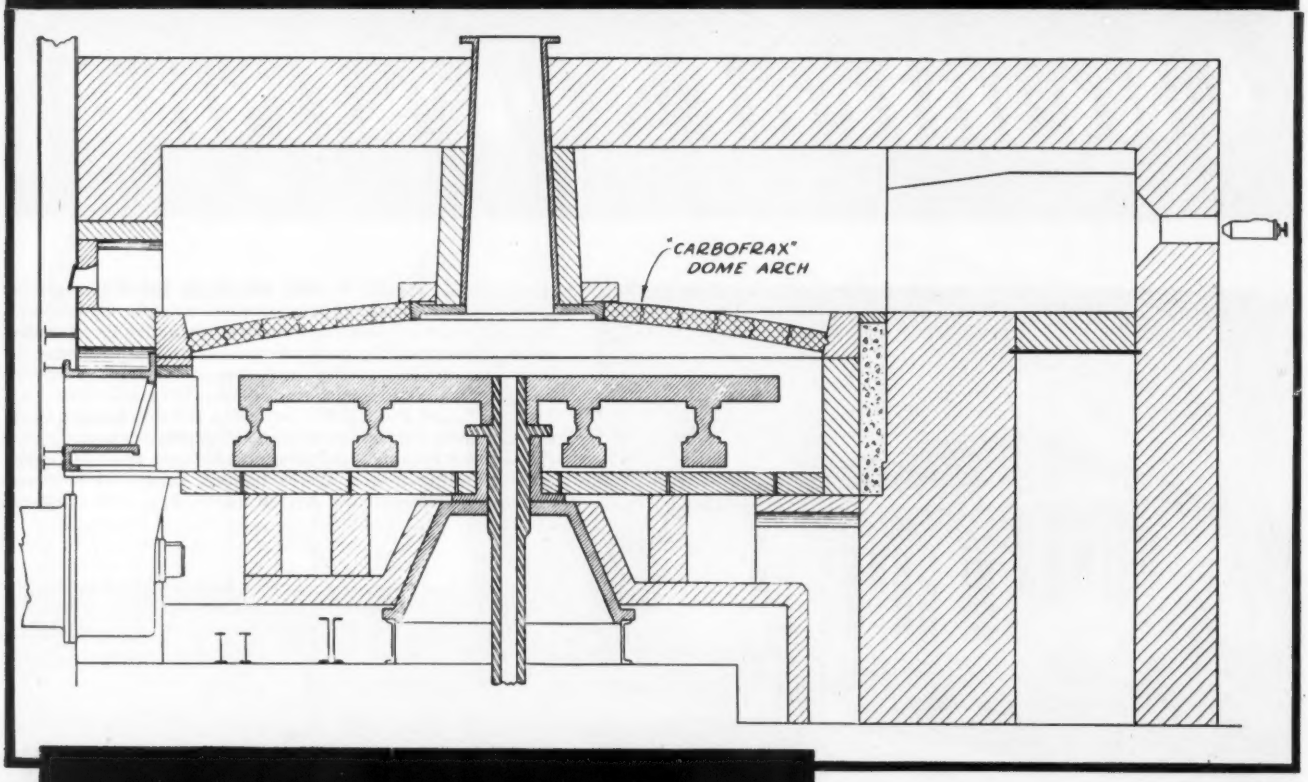
NO. 6 IN A SERIES DESCRIBING THE USE OF SUPER REFRACTORIES IN THE PROCESS INDUSTRIES



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Greater output follows the installation of a "CARBOFRAX" silicon carbide muffle arch in a Mannheim mechanical type muriatic acid furnace. In fact, operators report that production doubled after changing to a "CARBOFRAX" arch. And they accomplished this with no increase in fuel consumption.

Such results are made possible by the high thermal conductivity of the "CARBOFRAX" arch—approximately eleven to twelve times that of fireclay. Since the process takes nearly all its heat through the dome, the charge is heated faster, and much more heat is delivered into the chamber for a given fuel input.

Frequent shutdowns for arch repairs are eliminated by the long life obtained from the "CARBOFRAX" arch—its outstanding strength at elevated temperatures provides for that. With this extended life a further aid to greater production is secured. Labor and refractories costs, too, are lowered.

In the chemical, petroleum and metallurgical fields numerous applications of super refractories by "CARBORUNDUM" are proving their value in increasing production — reducing maintenance expense—lowering operating costs. Ask one of our refractories engineers to discuss with you these products and their possible uses in your plant.

THE CARBORUNDUM COMPANY
Refractories Division
Dept. F-4, Perth Amboy, N. J.

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Super Refractories by **CARBORUNDUM** TRADE-MARK

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BENZALDEHYDE is currently under General Allocation Order M-300, Schedule 7. The small order exemption is 50 pounds in any one calendar month.

Write for further information, and technical data sheets

HEYDEN *Chemical Corporation*

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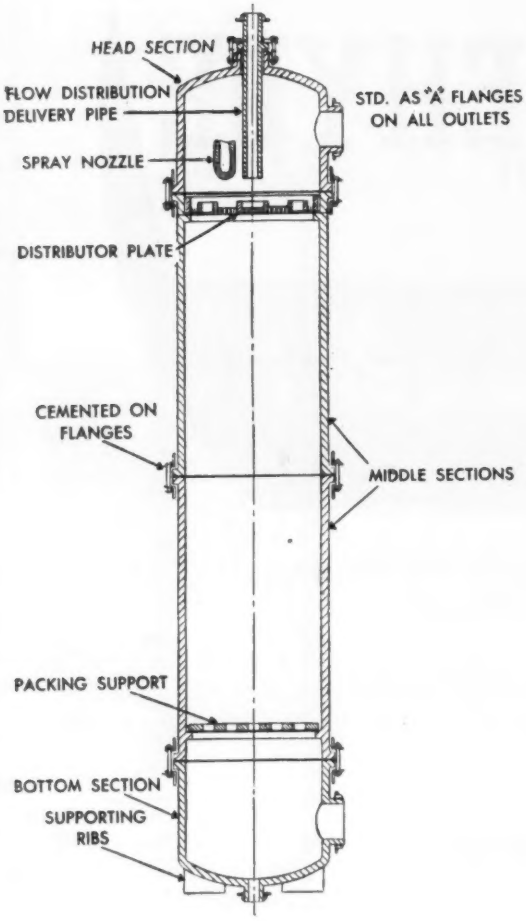
New Processes Call for Higher Pressures

General Ceramics

PRESCRIPTION FOR PROCESSING

at higher pressures is

Flanged Stoneware Towers



One of the most important units of chemical processing equipment is the tower for absorption, reaction, and distillation. Since most chemical processes involve the use of corrosive liquids and vapors, chemical stoneware has long been a popular material of construction for this equipment. The widely used Bell and Spigot tower, however, has the disadvantage of being unable to withstand pressures greater than 1″ or 2″ of Hg. To meet the demands of industry for a tower which is not only corrosion resistant, but CORROSION PROOF, and which can be operated at pressures as high as 20 psig, General Ceramics has designed and adopted as standard equipment the flanged tower illustrated.

Design Features of General Ceramics Flanged Towers

1. **Tower flanges are steel, cemented to the body, providing equal bearing on all joints, and eliminating assembly in the field.**
2. **Tower outlets have standard ASA flanges, facilitating piping installation.**
3. **Stoneware flanges are either ground for gaskets, or ground and polished for vacuum operation.**
4. **Towers are available in diameters of 12, 18, 24, 30, 36, 42, and 48 inches.**
5. **A standard distributor plate or a spray nozzle can be supplied.**

Adaptations of this standard design in both stoneware and porcelain and armored towers for higher operating pressures can be built to your specifications.

For further information on flanged towers and other chemical stoneware equipment, write to:

GENERAL CERAMICS AND STEATITE CORP. 7721

CHEMICAL EQUIPMENT DIVISION

KEASBEY, NEW JERSEY

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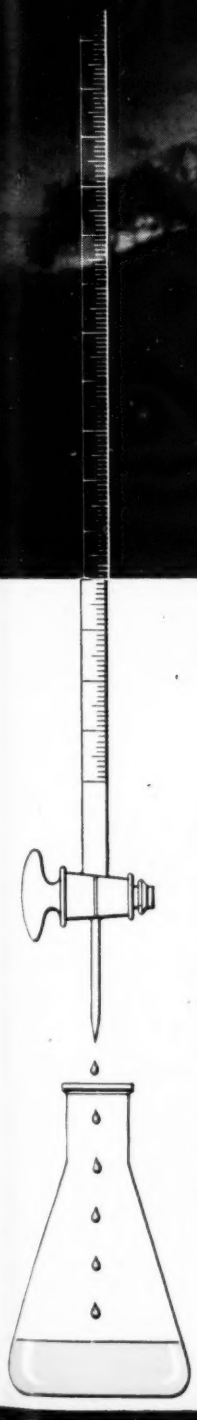

Guns speak—colored smoke TALKS... thanks to chemical exactness

Heavy artillery lays downs a barrage. And suddenly, clouds of red, yellow, green or violet smoke rise from the guns...

That smoke is *talking*—sending a message of vital import.

In an ever-changing color code, the smoke signals the range—advises of prearranged aerial support—identifies friendly troops and vehicles—gives information on many other situations.

When these big guns announce the battle is on—when lives of advancing men are at stake—the importance of chemical exactness in the manufacture of shells, and in making all fighting supplies, is paramount. Chemical exactness for testing quality — chemical exactness for processing — or chemical exactness in the manufacture of war supplies themselves.

Yes, the chemist is virtually fighting with our men. It is he who controls the quality of our guns and ammunition, our signaling and communication systems, our ships, airplanes, jeeps, tanks, and war supplies of every kind.

Chemical exactness is an art long associated with the name of J. T. Baker Chemical Co. A pioneer in reagent laboratory chemicals with the *actual analysis on the label*, Baker has been trained to produce purity to the decimal, for Fine and Industrial Chemicals to the Government's predetermined and exacting specifications.

If you have special chemical requirements for war production or in anticipation of post-war needs — if you require chemical measured purity to predetermined standards, we invite you to discuss your problems in confidence with Baker.

We may be able to help you, for Baker Chemicals are kept abreast of industry's exacting needs.

J. T. Baker Chemical Co., *Executive Offices and Plant:* Phillipsburg, New Jersey. *Branch Offices:* New York, Philadelphia and Chicago.

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Baker's Chemicals

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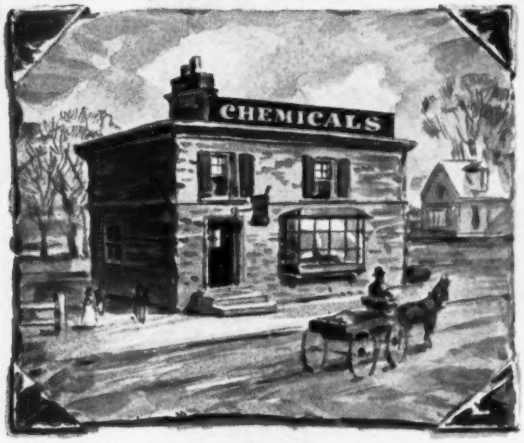
CSC ROSSVILLE

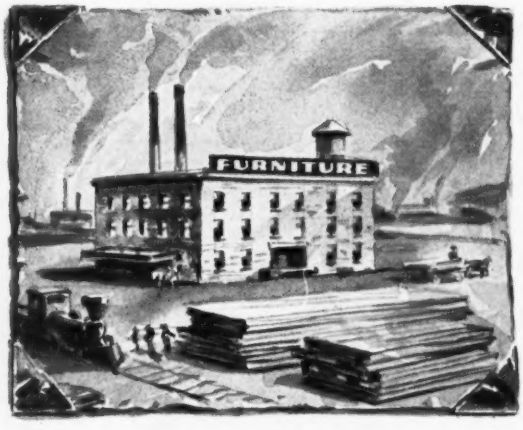
For the greater part of a century, the name Rossville has been the hallmark of fine alcohol. The traditions on which the Rossville reputation was so firmly established have been carefully fostered and strengthened through the years that Rossville has been identified with Commercial Solvents.

LONG recognized as the highest achievement of the distiller's art, C.S.C. *Rossville Hexagon Cologne Spirits have been specified for generations in the finest cosmetics . . . as well as in other products where only the highest quality alcohol can be used.



AMONG the most discriminating chemical manufacturers, as well as others, the favor which C.S.C. *Rossville Algrain Alcohol has found is a tribute to both modern scientific production methods and "old fashioned" Rossville craftsmanship.

EVEN before the Civil War, Rossville Alcohols were being used in hospitals. C.S.C. *Rossville Gold Shield Alcohol is a superior quality molasses alcohol specially refined for any industrial or scientific purpose where an alcohol of high purity is required.



ALL C.S.C. Rossville Alcohols are available in pure form (U.S.P.) or in any denatured formula . . . and also in anhydrous form, made by a patented process using neutral salts only. These improved anhydrous alcohols are evidence of the continuing devotion to the Rossville tradition of making only the finest.

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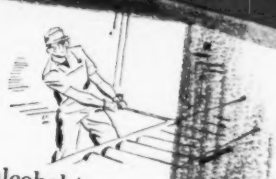
Family Album

Today, there are also many derivatives of C.S.C. Rossville Alcohol which have many important industrial applications. Can these C.S.C. products serve you?



*SHELLACOL

A proprietary alcohol-type solvent of moderate cost and mild, agreeable odor. Ideal as a shellac solvent and thinner . . . as a cleaner and solvent in the metal, printing, laundry, and protective coating industries.

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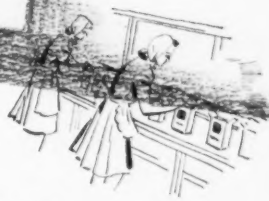
Solvent for cellulose nitrate and acetate, camphor, oils, gums, fats, and resins. Used in artificial leather, aircraft dopes, synthetic fibers, coated paper, quick-drying lacquer inks, polishes, cements, plastics, explosives, medicinals, perfumes, and flavors.

ETHYL OXALATE

Used in the manufacture of pharmaceuticals. Also as a dye intermediate, and for chemical syntheses.



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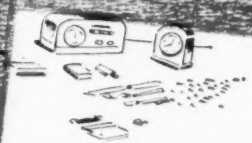
A fumigant and larvicide for the treatment of tobacco, cereals, and dried fruits. Also a raw material for the synthesis of Vitamin B_1, resins, and synthetic flavors.

ETHYL LACTATE

Solvent for cellulose esters and ethers, resins, and gums. Used in lacquers, dopes, inks, synthetic finishes, and varnishes.



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Plasticizer for cellulose nitrate and acetate. Used in a variety of cellulose ester dopes, lacquers, and plastics . . . also as a fixative for perfumes and essential oils.

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ANHYDROUS FERRIC CHLORIDE

$FeCl_3$

A USEFUL CATALYST
...EXTREMELY PURE
...HIGHLY SOLUBLE

Anhydrous Ferric Chloride is a completely water-free form of Ferric Chloride containing 98% or more $FeCl_3$ by weight.

It is composed of small greenish-black crystals with a melting point of 577.4° F.

EXTREMELY HYGROSCOPIC—it is readily soluble in water to 45% concentrations at room temperatures over 55° F.

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MANUFACTURING COMPANY
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New York • Chicago • St. Louis • Pittsburgh • Cincinnati • Minneapolis • Wyandotte • Tacoma

CARBOWAX

TRADE-MARK

COMPOUNDS DO THESE JOBS WELL

Have you tried them in your processes?

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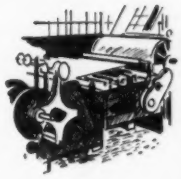
When dilute aqueous solutions of CARBOWAX compounds are used as mold lubricants, there is a minimum of carbon build-up. The cured articles are easily released from the mold.

2 textile lubricants



CARBOWAX compounds and their water solutions serve as lubricants for rayon and other textile fibres. One water rinse is sufficient to remove the size.

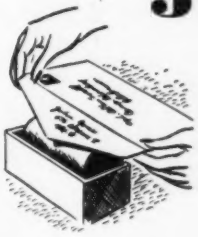
3 cosmetics

Pancake make-up, shaving creams, hand lotions and hair preparations are among the many cosmetic formulations now made with CARBOWAX compounds. CARBOWAX compounds are water-soluble, and may be obtained in a wide range of viscosities permitting close control over the consistency of the finished product.

4 medicinal ointments

CARBOWAX compounds are water-soluble, inert, and will facilitate the action of the active ingredients. Their use in topical preparations has been sanctioned by the Food and Drug Administration.

5 adhesives



CARBOWAX compounds are used to stabilize the moisture content of adhesives. In envelope flap glues they keep the paper from curling.

CARBOWAX solid polyethylene glycols are available in five different molecular weights, ranging in appearance and consistency from a soft petrolatum-like solid to a hard wax. Further information on their properties and uses will be found in the booklet "Technology of the Polyethylene Glycols and Carbowax Compounds" (Form 6013). Send for your copy today.

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The use of the Bagpak Method means undivided responsibility, since we supply both bags and packing equipment. You can be assured of more prompt deliveries if you will permit our Engineering personnel to confer with you *now* on any present or future project. Inquiries given immediate attention.

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ONE-MAN PACKAGE EASY TO HANDLE

"Tomorrow is *another* day"

Because, for almost a century, Powell Engineering has been anticipating the flow control requirements of products and processes still in the laboratory stage, Powell was ready to meet—and has met—every new demand imposed by war. Today we can justifiably say "there's a Powell Valve for every *known* requirement of industry."

But "tomorrow is another day" and it will bring new problems in flow control. Powell, as always, will be ready to solve them.

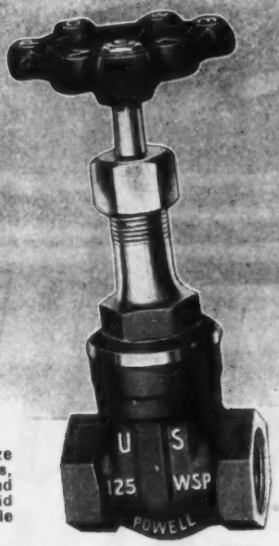
The Wm. Powell Co.

Dependable Valves Since 1846

Cincinnati 22, Ohio

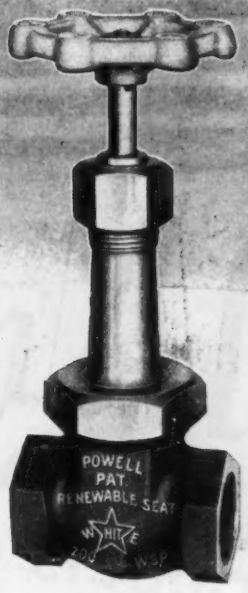
1793

Fig. 1793—125-pound Iron Body Bronze Mounted Gate Valve with Flanged ends, outside screw rising stem, bolted flanged yoke, bronze seats, and taper wedge solid disc. Available with taper wedge double disc. Fig. 1444.



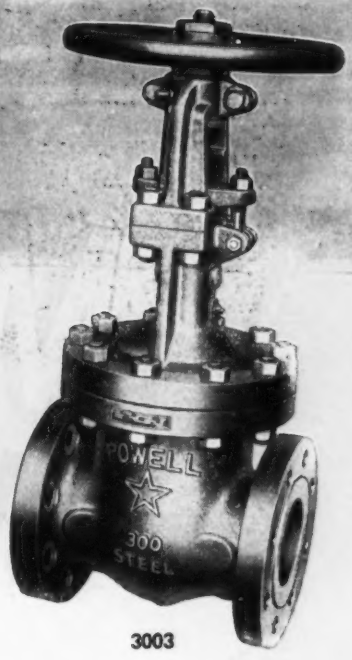
500

Fig. 500—125-pound Bronze Gate Valve, with screwed ends, inside screw rising stem, screwed bonnet and either taper wedge solid or double disc.



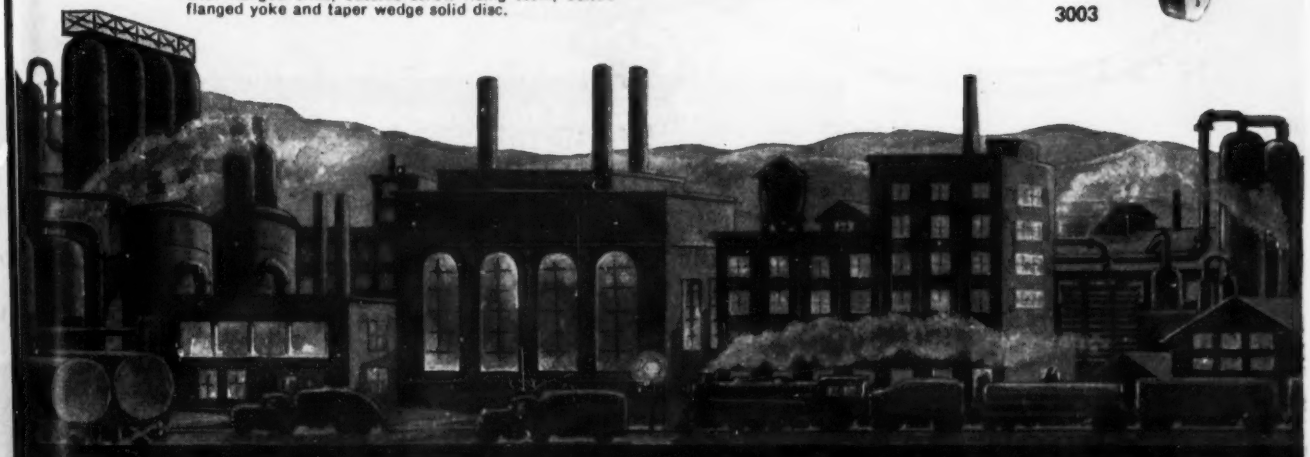
1375

Fig. 1375—200-pound Bronze Gate Valve, with screwed ends, inside screw rising stem, union bonnet and wear-resisting nickel bronze seat rings and disc.

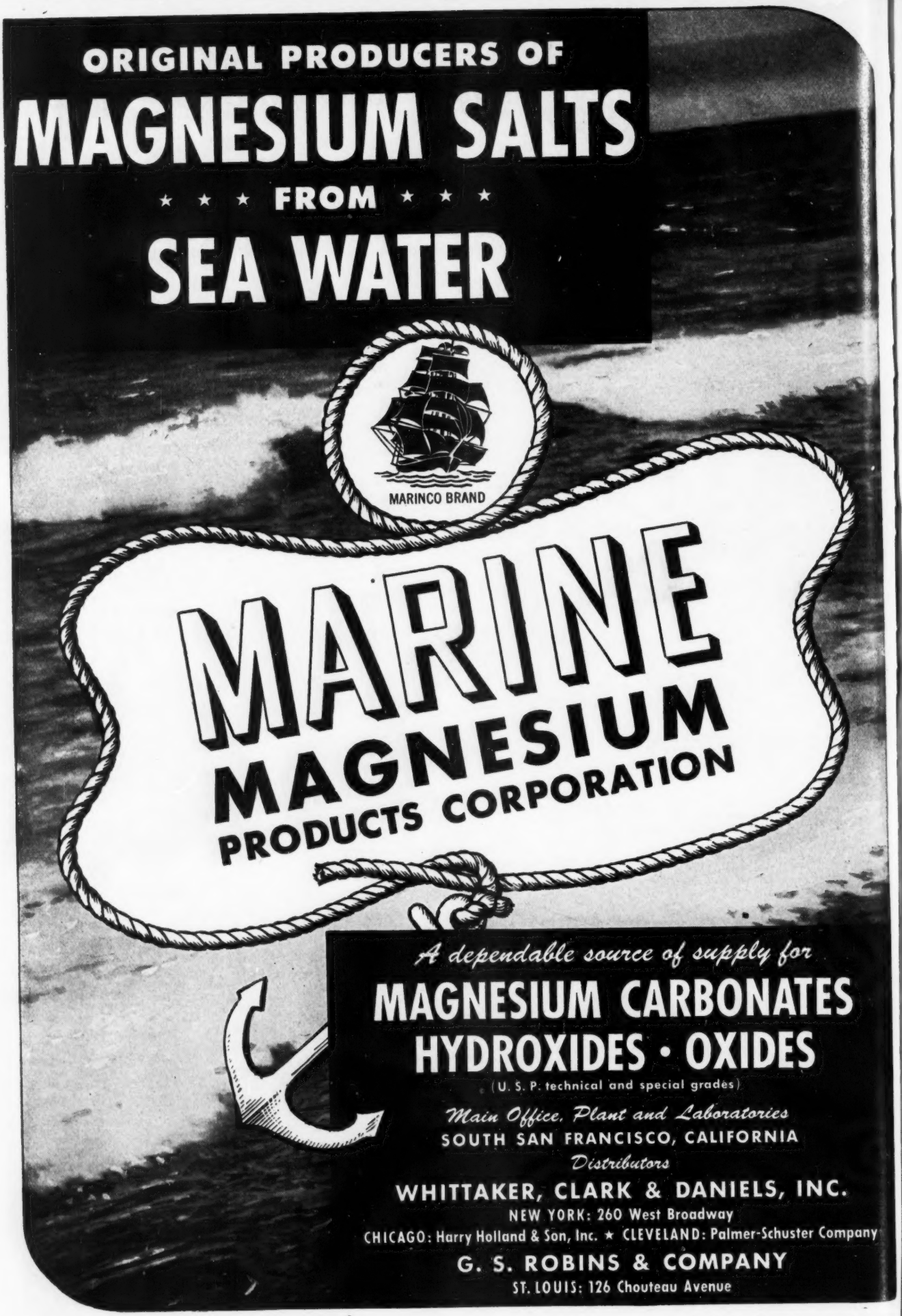


3003

Fig. 3003—Class 300-pound Cast Steel Gate Valve, with flanged ends, outside screw rising stem, bolted flanged yoke and taper wedge solid disc.



POWELL VALVES



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Chemical Industries

4 NEW FLEXIBLE KARBATE

TRADE-MARK

EQUIPMENT CONNECTIONS

Strength, flexibility, and ease of installation distinguish four new improved "Karbate" chemically resistant equipment connections now available. Their designs are the result of years of experience by National Carbon Company, Inc., in furnishing "Karbate" impervious carbon or graphite equipment to the chemical, process and other industries.

Like the many "Karbate" specialty products used for storage, conveying, handling and processing of corrosive liquids and gases, these connections are not only strong but have high resistance to mechanical and thermal shock and to the action of most acids—notably hydrofluoric—alkalies, and other corrosive chemicals.

For additional information about the new "Karbate" equipment connections, write to our nearest Division Office for Catalog Section M-8805.

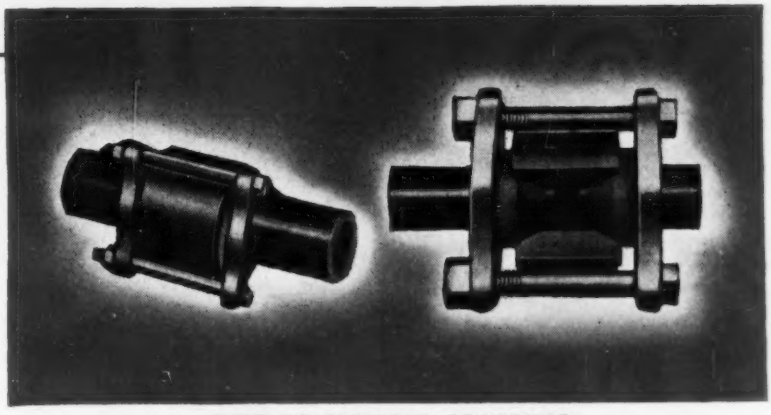
The word "Karbate" is a registered trade-mark of National Carbon Company, Inc.

KEEP YOUR EYE ON THE INFANTRY
. . . THE DOUGHBOY DOES IT!

NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC

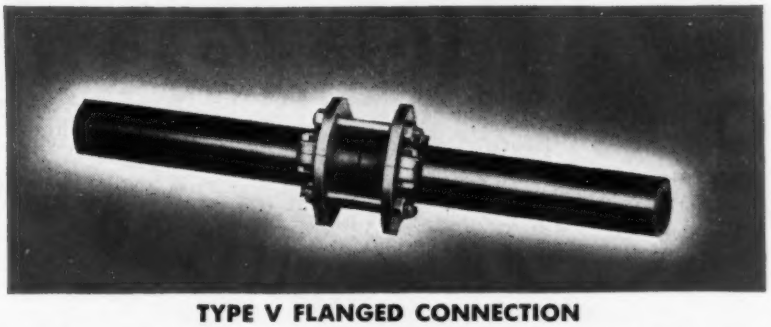
General Offices:
30 East 42nd Street, New York 17, N. Y.

Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco



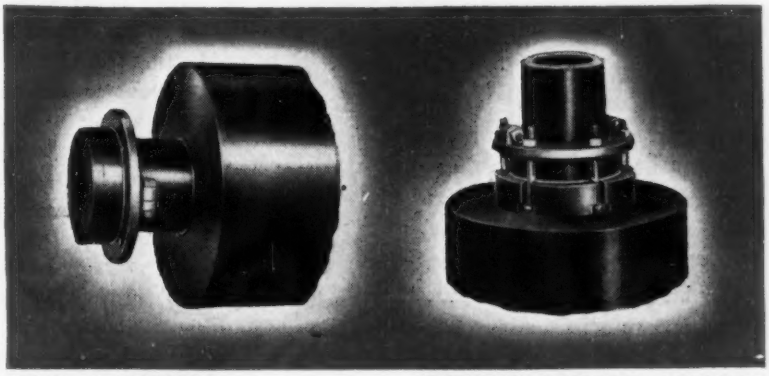
TYPE FC FLEXIBLE COUPLING

Easily installed or dismantled on the job. Simplifies final pipe length adjustment between pieces of equipment. Permits movement in any direction to protect "Karbate" piping from effects of vibration, misalignment and differential expansion. Used with "Karbate" pre-assembled standard nipples and fittings, pipe may be cut to length and rapidly installed in the field.



TYPE V FLANGED CONNECTION

Thick, small diameter collars provide sturdy construction which can be used with companion flanges of almost any design or material. The separate cast iron split flanges permit easy pipe alignment and installation.



TYPE V NOZZLE **TYPE SC SLOTTED COUPLER**

Recommended for connections on "Karbate" tanks, towers, heat exchangers and similar equipment. Generally installed at our factory and not particularly suitable for field installation. The Slotted Coupler is of more compact construction than the Type V Nozzle, but the choice of connection depends upon requirements of each job.

BULLETS FOR PROTECTION

WHITE-CAPPED girls in the Packaging Division of Merck & Co., Inc. fill and seal thousands of ampuls of potent chemotherapeutic materials each day. These glass bullets are earmarked for life protection—*not* destruction. Yet, just as surely as metal bullets, they play a vital part in wartime.

For these are important weapons in our fight for Victory. Without these drugs, and many others produced by Merck, hundreds who now live would die each day, and thousands more would be forced to drop out of the ranks—either in our Armed Forces or on the production front.

This great rear-guard action of Merck workers reveals itself in many fields. In the manufacture of quinine, atabrine, and totaquine—so essential for the control of malaria. In the production of anesthetic agents for the relief of pain. In the manufacture of arsenicals—so indispensable in the control of syphilis. In the pioneering development of the sulfa-drugs and penicillin for the treatment of wounds and infections. And in the synthesis and production of pure vitamins—so essential in the fields of medicine and nutrition.

In these specific fields, and in many others, Merck & Co., Inc. is devoting its rich heritage of experience, its research activities, its vast resources and modern production facilities, to the service of the Government, the professions, and industry in America's united war effort against aggression and disease.

ARMY E NAVY
Speed the Victory with War Bonds

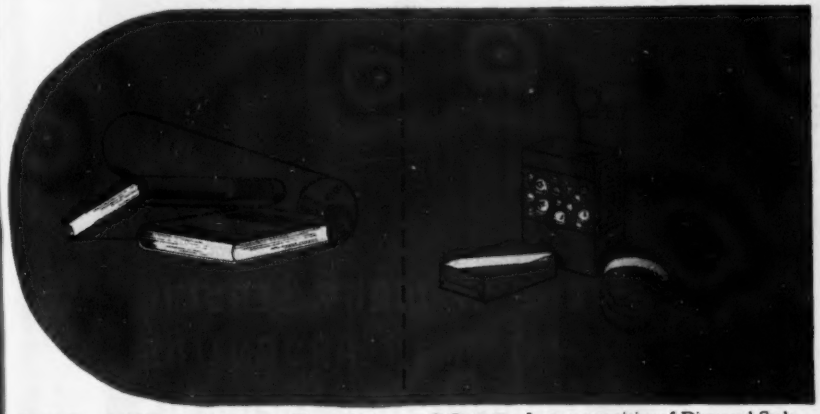
MERCK & CO., Inc. *Manufacturing Chemists* **RAHWAY, N. J.**

New York, N. Y. · Philadelphia, Pa. · St. Louis, Mo. · Elkton, Va. · Chicago, Ill. · Los Angeles, Cal.

In Canada: MERCK & CO., Ltd., Montreal and Toronto

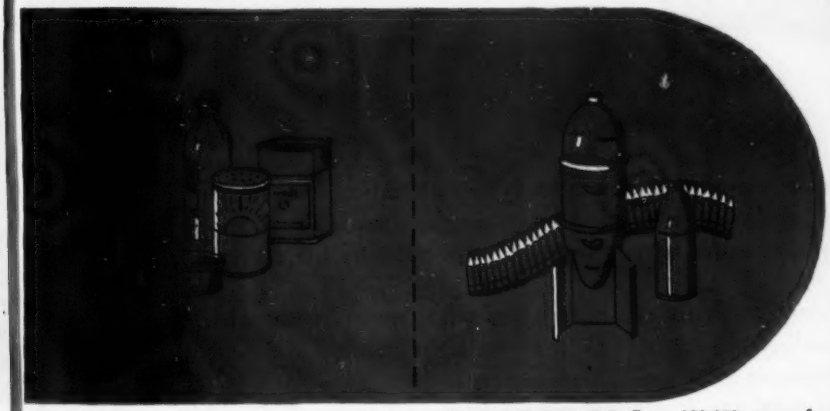
GLASS Uniform, dependable Diamond Soda Ash is an important glass-making ingredient.

ALUMINUM Much Diamond Soda Ash is consumed in the manufacture of aluminum for war or peace.



PULP AND PAPER The high quality of Diamond Soda Ash recommends its use in making pulp and paper.

SOAP Large quantities of Diamond Soda Ash are consumed in preparing various types of soap.



CLEANERS Soda Ash is a principal ingredient in the manufacture of household cleansers.

EXPLOSIVES Over 100,000 tons of Soda Ash are required annually for war-time explosives.

TEXTILES Soda Ash is employed in the dyeing and finishing of textile fabrics.

CHEMICALS Diamond Soda Ash is an important basic raw material for many drugs and chemicals.

Diamond Soda Ash

Na_2CO_3

One of our most useful raw materials is Soda Ash. In the Diamond manufacturing system, constant quality control insures the purity and uniformity required for present and future use.

Diamond Alkali Co.

Pittsburgh, Pa. and Everywhere

meet a biological engineer

Not solely a research worker, nor an engineer, he is a combination of both. He is making news today. Recently described as a biological engineer by a prominent national weekly, he fully lives up to that impressive-sounding designation in his service to man's well-being.

Using special Pfizer techniques, he deals with molds and microbes . . . with cultures and media . . . carrying out biological processes in large scale production. He controls thousands of gallons as accurately as a few cubic centimenters.

In products as well as processes, the biological engineer creates news. A frequent headline-maker is penicillin, the powerful antibiotic drug of which we at Chas. Pfizer & Co. are the world's largest makers. As manufacturing chemists since 1849, a scientific background serves us in good stead when sudden new demands call for drastic expansion in our production facilities. Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 444 West Grand Avenue, Chicago 10, Ill.

PFIZER QUALITY

PFIZER

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

Manufacturing Chemists Since 1849

Untouched! Better packaging has resulted from the use of glycerine—in the making of transparent wrappings that come in contact with foods or food products. C.P. glycerine is safe and nontoxic.

Soothing! Glycerine (C.P.) has definite emollient properties. That's one reason why it's a standby in the cosmetics business. And one reason why it pays to use time-proved glycerine.

Why Glycerine Is Superior in PHARMACEUTICALS, COSMETICS, FLAVORINGS

Glycerine (C. P.) is—*Nontoxic.* It may be used internally or externally.

A Food. Glycerine is substantially equivalent in food value to carbohydrate.

Glycerine (C. P.) has—*A pleasant, sweet taste.* High sweetening power. No bitter aftertaste.

High viscosity. This property contributes desirable "body" to products made with it.

Emollient properties. In cosmetics, it soothes and softens harsh, dry skin.

Humectant properties—in the right degree. Glycerine helps keep your product in its original fresh condition. Its low vapor pressure makes it "stay put."

High solvent power and compatibility. It dissolves a wide variety of materials. It is one of the two or three commonest liquid constituents of prescriptions. In flavoring extracts it remains in the final product even when heated to a rather high temperature, as in baking. It is compatible with common ingredients of cosmetics, dentifrices, etc.

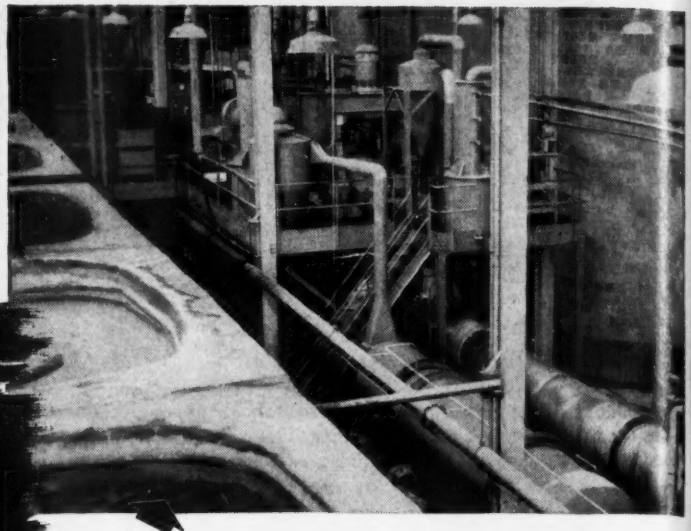
Glycerine (C.P.) is important as a solvent, humectant, carrier, plasticizer, and component of many other products besides pharmaceuticals, cosmetics and flavoring extracts. Its many valuable properties, plus its economy, make it a standby in many American industries. Use glycerine, now freely available for the production of civilian goods! Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y. Dept. N-8

Good Eating! Crystal-clear glycerine (C.P.) is a food in itself. It is a nutritious product of nature. No wonder it is so useful in the making and processing of many foods and beverages!

Flavorsome! C.P. glycerine, which has high sweetening power—with no bitter aftertaste—and with a high boiling point—is ideal for use in the making of flavorings. Use glycerine.

Flocking Back to Glycerine! Recent laboratory analysis of leading dentifrices showed that 12 out of 13 dentifrice manufacturers have returned to glycerine. So have many other manufacturers!

STOP CORROSION with Prufcoat Protective Coatings



Prufcoat is in use on Concrete Structures, Steel Structures, Railway Tank Cars, Masonry Walls, Concrete Floors, Chemical Handling Equipment, Tank Trucks, Ventilating Systems, Cast Stone, Stucco, Brick, Sprinkler Systems, Cement Blocks, Chemical Tanks, *and has licked corrosion problems involving temperature ranges up to 230° F. and chemical agents such as* Acetic Acid, Alum, Bleach Solutions, Calcium Chloride, Chlorine, Cyanides, Formaldehyde, Flue Gases, Hydrofluoric Acid, Lactic Acid, Mineral Oils, Muriatic Acid, Nitric Acid, Oleic Acid, Oleum, Phosphoric Acid, Salt Solutions, Sodium Hydroxide, Steam, Sugar, Sulfonated Oils, Sulfuric Acid, Tri-Sodium Phosphate.

Cut Maintenance Costs

Low original cost and long life of Prufcoat make its application on all surfaces the lowest cost method of maintenance. For Prufcoat costs only slightly more per gallon than ordinary paint, costs no more to apply, *and yet provides positive protection against acids, alkalis, and water.* Thus, longer life and less frequent repaint jobs make maintenance savings certain.

Proved in hundreds of America's largest industrial plants during the past five years*, Prufcoat is being used today not only in areas where corrosion is severe, but on all structural steel and concrete, inside and outside. For Prufcoat cuts maintenance costs whether the corrosion problem is mild or severe.

Whatever your problem may be, chances are Prufcoat can show you a performance-proved treatment. Write today for descriptive folder.

The Prufcoat film formed after Polymerization has virtually a zero acid number, saponification number and water absorption rate.

PERFORMANCE-PROVED ON CONCRETE AS WELL AS METAL SURFACES

Prufcoat Protective Coatings have been able to perform the heretofore thought impossible job of corrosion-proofing concrete, bricks, masonry, cast stone, etc., as well as metals and less troublesome surfaces. For the Prufcoat film is proof against the alkali reaction of concrete and similar materials, as well as acid-proof. Made from a special combination of synthetic resins and inert pigments, Prufcoat is applied by brush by your own maintenance crew, and dries by evaporation of the volatile solvents. Subsequent polymerization provides a tough, non-oxidising, completely acid, alkali and waterproof film. The Prufcoat vehicle is crystal clear and contains no drying oils, wax, stearates or bitumen. Plasticity can be controlled from permanent tackiness to brittleness, as desired. Available in a variety of standard colors, making possible identification of lines and other equipment by color.

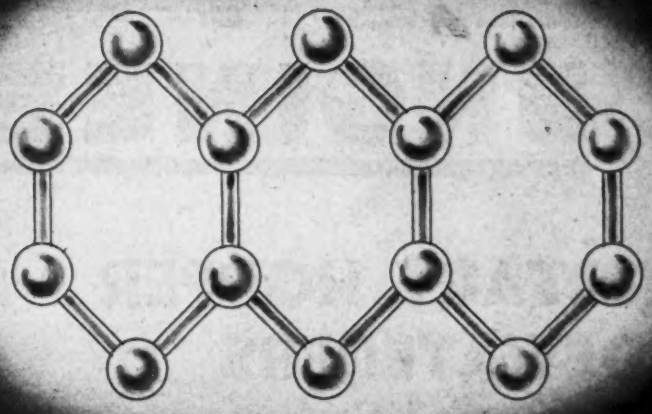
Prufcoat reports from some of America's largest plants (Names upon request)

- Prufcoat on all structural steel, pipes, pumps and tanks subjected to continuous dilute sulfuric acid fumes, drips and spills. No failure in two years.
- Entire concrete building coated with Prufcoat. No trace of failure due to blistering, peeling or chipping in over five years.
- Prufcoat on railroad tank cars carrying mixed acids and caustics—spills have not affected the coating in over two years.
- Prufcoat on exterior of muriatic acid storage tanks—no failure from spills or fumes since installation over two years ago.
- After several years of experience, Prufcoat has been made the standard corrosion-proofing coating for all maintenance work throughout the plant.

PRUFCOAT

gives Positive Protection against ACIDS, ALKALIS and WATER!

Prufcoat Laboratories Incorporated · 63 Main Street, Cambridge (42), Massachusetts



NUCHAR purifies Cyclic Hydrocarbons

IN THE purification processes of the chemical industry, such as in the manufacture of Cyclic Hydrocarbons, the use of Nuchar Activated Carbon results in clearer, purer, more marketable products because of its ability to adsorb invisible impurities by trapping them within its billions of activated particles.

These purification methods as shown in The Chemical Dictionary are typical examples where the use of Nuchar Activated Carbon is particularly adaptable:

Diphenyl: Method of purification—crystallization.

Fluorene: Method of purification—crystallization.

Naphthalene: Method of purification—crude crystals are purified by hydraulic pressing or by centrifuging and treated with H_2SO_4 followed by sublimation.

Anthracene: Method of purification—by sublimation with superheated steam, or by crystallization from benzene followed by sublimation.

Phenanthrene: Method of purification—fractional oxidation (chromic or nitric acid) to remove anthracene.

Nuchar removes impurities — off-color and off-odors — by adsorption without affecting or altering the molecular structure of chemical compounds.

An increasing number of chemical manufacturers are employing Nuchar as a purification agent without adding elaborate distillation or sublimation equipment. The purification process using Nuchar Activated Carbon always proves a money-saver. Our technical staff will be glad to assist in your problems and suggest the particular grade of Nuchar Activated Carbon best fitted for your process.

Nuchar Activated Carbons ★ Abietic Acid ★ Snow Top Precipitated Calcium Carbonate ★ Liquid Caustic Soda ★ Chlorine Indulin (Lignin) ★ Liqro Crude Tall Oil ★ Indusoil Distilled Tall Oil ★ Tall Oil Pitch ★ Sulphate Wood Turpentine

NUCHAR

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP AND PAPER COMPANY

230 PARK AVENUE, NEW YORK 17, N.Y. · 35 E. WACKER DRIVE, CHICAGO 1, ILLINOIS · 748 PUBLIC LEDGER BLDG., PHILADELPHIA 6, PA. · 844 LEADER BLDG., CLEVELAND 14, OHIO

GENERAL for ENGINEERED

CONKEY ROTARY HOPPER VACUUM DEWATERERS

. . . are high capacity top feed vacuum filters for fast settling and rapidly segregating slurries. They are particularly successful in the dewatering of classifier oversizes and light bulky solids having a tendency to sluff off the conventional drum. Conkey design takes full advantage of the effect of classification, with cloth blinding minimized. As no adjustment of feed consistency is necessary, continuous automatic operation requiring practically no supervision is achieved.

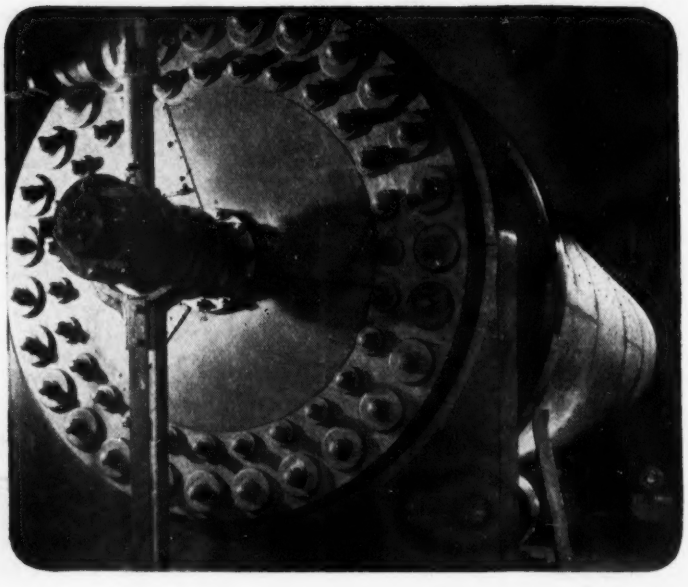
THICKENERS AND HYDROSEPARATORS

General American Thickeners and Hydroseparators offer new and distinct advantages over conventional designs.

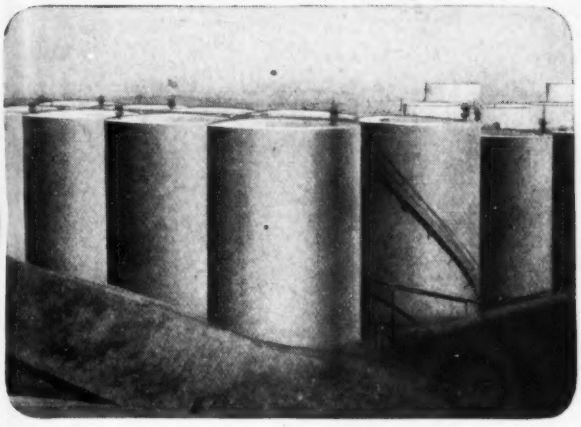
Greater Raking Capacities per unit area due to heavier construction of mechanism and improved design of raking blades. . . . *Hydraulic Rake Arm Lifting and Lowering Mechanism* for large and small units operated by automatic or push-button control. . . . *Higher Underflow Densities* resulting from improved control—which eliminates much of the "human element"—and from ease of adjustment to optimum operating conditions.

LOUISVILLE ROTARY DRYERS

For over half a century, Louisville Rotary Dryers have been widely accepted as *first in the field*. . . . Individually-engineered for the one particular job it is to perform, every Louisville Dryer is designed and built to give optimum drying results at the lowest possible drying costs. Hundreds of Louisville Dryers have therefore paid for themselves often in periods of a few months, from *savings in drying costs*. We would be happy to estimate the economies or other advantages a Louisville Dryer could effect in your drying operations.



AMERICAN EQUIPMENT!



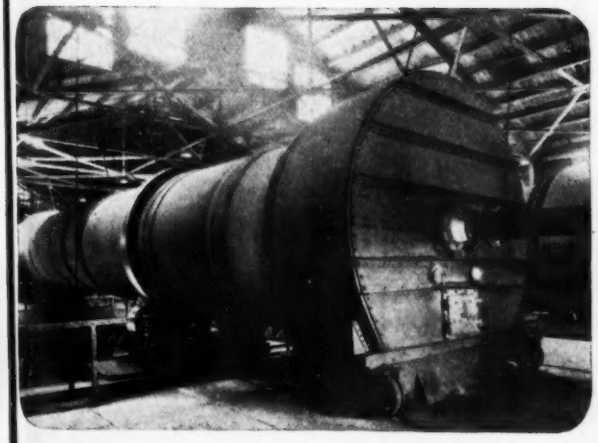


PLATE FABRICATION
Either Welded or Riveted

The General American line also includes a long and diversified list of plate fabricated products manufactured by the Plate & Welding Division at Sharon, Pennsylvania.

The Plate & Welding Division makes custom-built products, precision-built to customers' own designs, as well as standard products on which it has had years of highly specialized experience. These products include accumulators, crystallizers, dissolvers, heat exchangers, absorption towers, condensers, rotary kilns, pressure vessels, digesters, storage tanks for any commodity, and many other types of plate fabrication, either welded or riveted.

General American is prepared to build equipment in any steel, alloy or other metal. Pressure vessels are designed and tested to any required standard — ASME, API-ASME, State, or other Codes . . . field-erected storage tanks are built to customers' specifications or API Code.

In addition to its exceptionally large manufacturing facilities, General American maintains complete X-ray equipment, heat-treating and stress-relieving furnaces, as well as a staff of experienced engineers and scientists with extensive research, development and testing laboratories.

If you need any sort of fabricated equipment, investigate General American, and its ability to serve you. Technical information will gladly be sent you on request.

GENERAL AMERICAN
TRANSPORTATION CORPORATION
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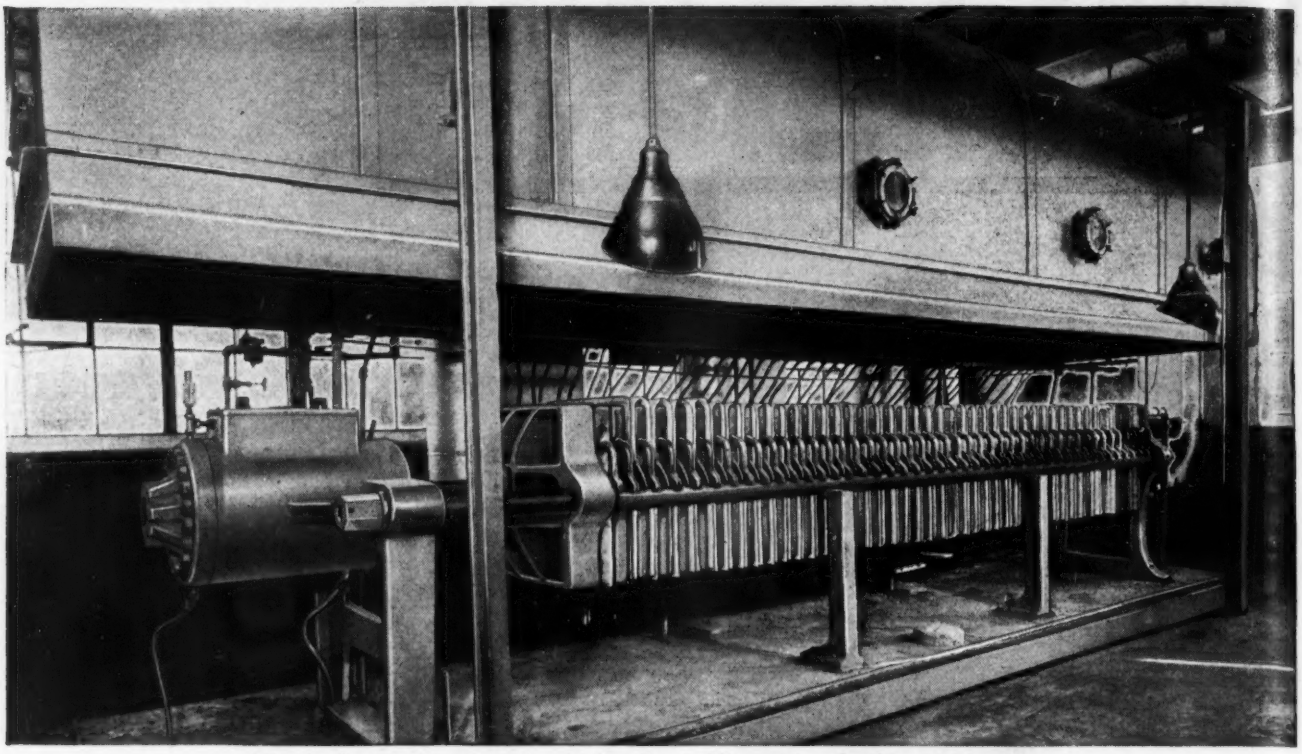
General Sales Offices: 513b Graybar Bldg., New York 17, N. Y. • *Works:* Sharon, Pa., and Louisville, Ky.

Sales Offices: Chicago, Sharon, Louisville, Cleveland, Pittsburgh, St. Louis, Salt Lake City, San Francisco, Tampa, Washington, D. C.

If you have a Filtration Problem . . . consult with SPERRY



Filtering hot solutions of wax in volatile solvents. Picture shows hood in raised position.

SPERRY FILTER PRESSES . . .

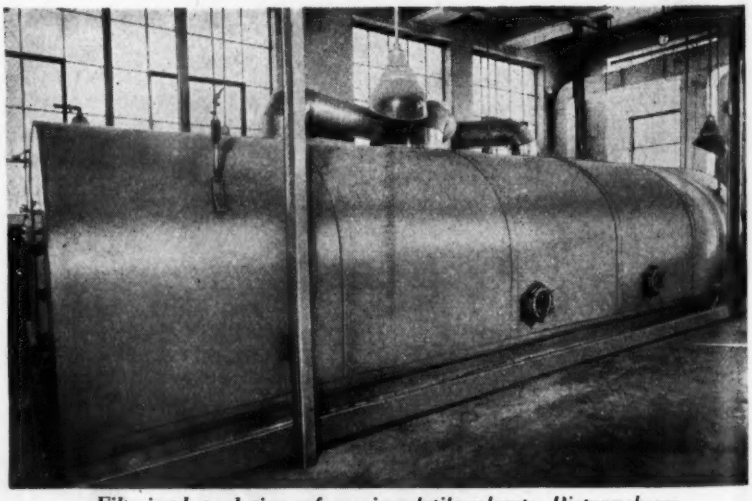
serve the makers of FAMOUS JOHNSON'S WAX

S. C. Johnson & Son, Inc., of Racine, Wisconsin employ specially designed Sperry Filter Presses as part of the manufacturing process of the famous Johnson's Wax Products. The hoods are to prevent the escape of gas fumes that occur when filtering hot wax solutions in volatile solvents.

Here is just another example of Sperry's ability to design and manufacture filter presses that successfully meet the challenge of a difficult filtration assignment.

If you have a filtration problem you can rely on Sperry's over fifty years' experience in this field to furnish filter presses that meet every reasonable requirement as to service and economy of operation . . . filter presses specially designed and built to the measure of your operation.

Our engineers will be glad to consider your problem . . . there is no obligation.



Filtering hot solutions of wax in volatile solvents. Picture shows hood in lowered position.

D. R. SPERRY & COMPANY, BATAVIA, ILLINOIS

Filtration Engineers for Over 50 Years

Eastern Sales Representative
Henry E. Jacoby, M. E.
205 E. 42nd St., New York 17
Phone: MUrray Hill 4-3581

SPERRY
FILTER PRESSES

Western Sales Representative
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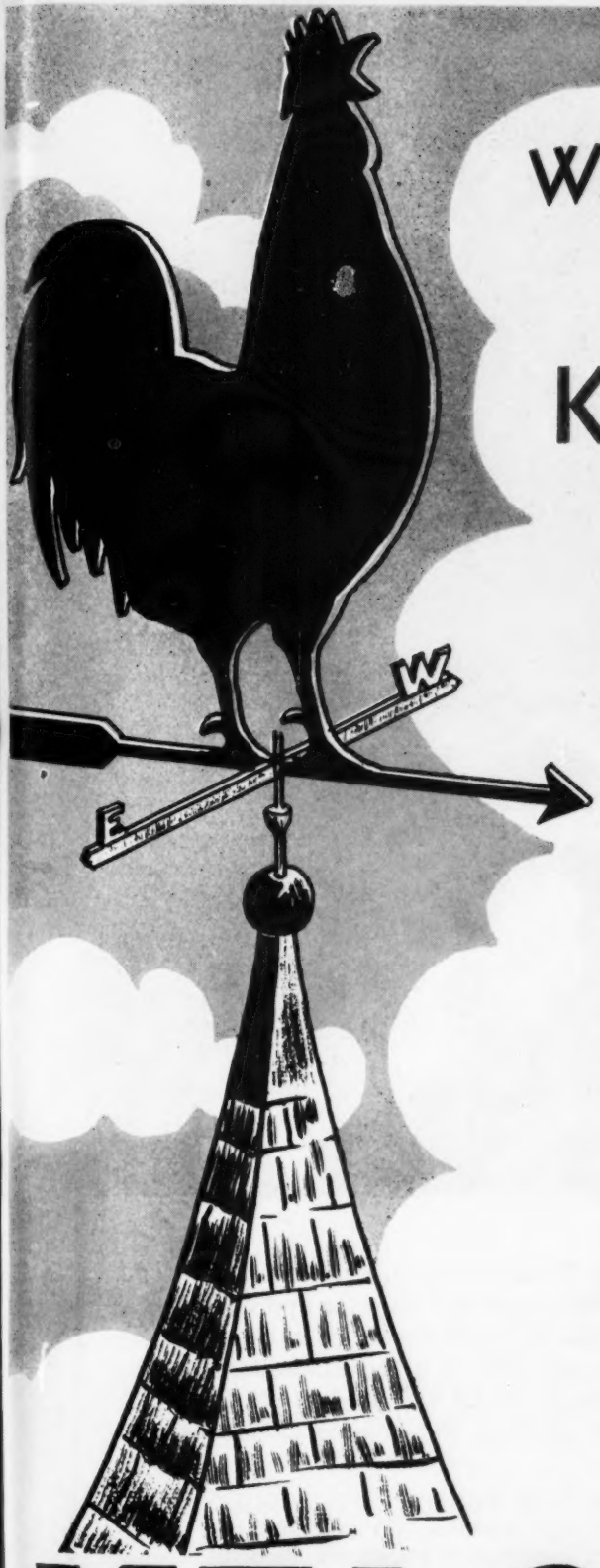


WEATHERCOCK ADAPTABILITY!

KELCO ALGIN

AVAILABLE IN BOTH EDIBLE AND INDUSTRIAL GRADES

As easily as the weathervane adjusts itself to wind direction, KELCO ALGIN adapts itself to a wide variety of commercial applications.

Available in both edible and industrial grades, KELCO ALGIN has proved highly effective as stabilizer, suspending agent, bodying agent or hydrophilic colloid — in scores of different food, pharmaceutical and industrial products.

KELCO ALGIN is manufactured to definite standards, scrupulously supervised. Unlike other nature products which may vary with changing conditions of growth or environment, KELCO ALGIN is a seaplant derivative that can be controlled and confined to the precise standards set up for any particular use.

For complete information on its advantages, simply write us your intended use and the pH range.

KELCO
REFINED ALGIN PRODUCTS

KELCO COMPANY

75 E. Wacker Drive
CHICAGO-1

31 Nassau Street
NEW YORK-5

530 W. Sixth Street
LOS ANGELES-14

No guess work! The hand is *trained*. The eye is *true*. The contents are *trustworthy*. "Trained," "true" and "trustworthy" likewise apply here, at Virginia-Carolina Chemical Corporation, where accuracy is the order of every day. It is such accuracy that accounts, in a large measure, for the consistently *exactly*-right performance of all V-C products in their various applications—both great and small—to the process industries.

PHOSPHORIC ACIDS—CALCIUM PHOSPHATES—SODIUM PHOSPHATES—SULFURIC ACID—SPECIAL PHOSPHATES AND COMPOUNDS . . . *Also distributors of other heavy chemicals*

VC CHEMICALS

VIRGINIA-CAROLINA CHEMICAL CORPORATION

RICHMOND, VIRGINIA

SALES OFFICES: Atlanta, Ga.; Baltimore, Md.; Birmingham, Ala.; Carteret, N. J.; Charleston, S. C.; Cincinnati, Ohio; Columbia, S. C.; Greensboro, N. C.; Jackson, Miss.; Memphis, Tenn.; Montgomery, Ala.; Norfolk, Va.; Orlando, Fla.; Richmond, Va.; Savanah, Ga.; Shreveport, La.; E. St. Louis, Ill.; Wilmington, N. C.

HAND IN HAND WITH INDUSTRY

SHARPLES SYNTHETIC ORGANIC CHEMICALS

Starting in 1926 with Pentasol (Amyl Alcohols) and Pent-Acetate (Amyl Acetates) as its sole products, Sharples now manufactures commercially over seventy Synthetic Organic Chemicals. The number of fields served by Sharples products has increased steadily and now includes more than forty industries.

One of Sharples' most recent and noteworthy expansions is in the synthesis of a class of organic nitrogen compounds known to the chemist as "Aliphatic Amines." Several of this class — Ethylamines, Butylamines, Amylamines and Diethylaminoethanol—have been produced by Sharples commercially for several years. Their value has been established already as intermediates for such products as antioxidants, pharmaceuticals, rubber chemicals and corrosion inhibitors.

Many other members of this versatile family of "Aliphatic Amines" are now in the development stage. When normal conditions of peacetime return, facilities for their commercial scale manufacture will be made available to meet the demands of an expanding Chemical Industry.

If your problems involve the use or synthesis of an organic chemical, we will welcome the chance to work with you.

Pentasol* (Amyl Alcohols) • Pent-Acetate* (Amyl Acetates) • Pentalarm* (Amyl Mercaptan) • Buramine* (Butyl Urea) • Pentaphen* (p-tert-Amyl Phenol) • Vultacs* (Alkyl Phenol Sulfides) • o-Amyl Phenol Diamyl Phenol • Diamylphenoxy Ethanol • Amylamine • Diamylamine • Triamylamine • Ethylamine • Diethylamine Triethylamine • Butylamine • Dibutylamine • Tributylamine • Diethylaminoethanol • Ethyl Monoethanolamine Ethyl Diethanolamine • Mixed Ethyl Ethanolamines • Dibutylaminoethanol • Butyl Monoethanolamine • Butyl Diethanolamine • Mixed Butyl Ethanolamines • Amyl Chlorides • Dichloro Pentanes • Amyl Naphthalenes Mixed Amylenes • Tetraethylthiuram Disulfide • Tetraethylthiuram Monosulfide • Tetramethylthiuram Disulfide Zinc Diethyldithiocarbamate • Zinc Dimethyldithiocarbamate • Zinc Dibutyldithiocarbamate • Cupric Diethyldithiocarbamate • Selenium Diethyldithiocarbamate • Amyl Sulfide

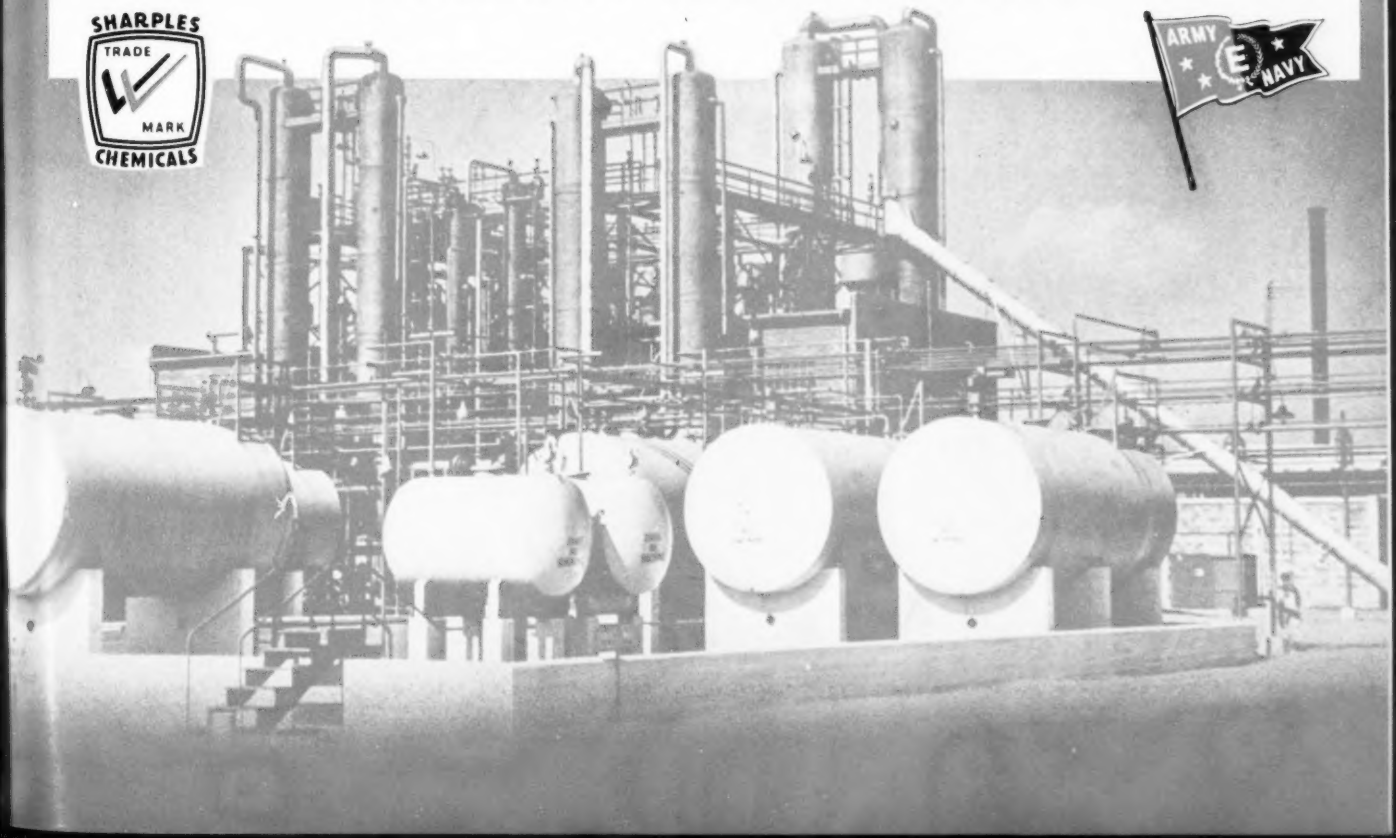
*Trademark Registered

SHARPLES CHEMICALS INC.

PHILADELPHIA · CHICAGO · NEW YORK

SHARPLES TRADE MARK CHEMICALS

ARMY E NAVY



SHARPLES SYNTHETIC ORGANIC CHEMICALS

PENTASOL* (AMYL ALCOHOLS)
PENT-ACETATE* (AMYL ACETATE)
PENTALARM* (AMYL MERCAPTAN)
BURAMINE* (BUTYL UREA, Tech.)
PENTAPHEN* (p-tert-AMYL PHENOL)
VULTACS* (ALKYL PHENOL SULFIDES)
PENTALENES* (AMYL NAPHTHALENES)

AMYLAMINE
DIAMYLAMINE
TRIAMYLAMINE
ETHYLAMINE
DIETHYLAMINE
TRIETHYLAMINE
BUTYLAMINE
DIBUTYLAMINE
TRIBUTYLAMINE

DIETHYLAMINOETHANOL
ETHYL MONOETHANOLAMINE
ETHYL DIETHANOLAMINE
MIXED ETHYL ETHANOLAMINES
DIBUTYLAMINOETHANOL
BUTYL MONOETHANOLAMINE
BUTYL DIETHANOLAMINE
MIXED BUTYL ETHANOLAMINES

TETRAETHYLTHIURAM DISULFIDE
TETRAETHYLTHIURAM MONOSULFIDE
TETRAMETHYLTHIURAM DISULFIDE
ZINC DIETHYLDITHIOCARBAMATE
ZINC DIMETHYLDITHIOCARBAMATE
ZINC DIBUTYLDITHIOCARBAMATE
CUPRIC DIETHYLDITHIOCARBAMATE
SELENIUM DIETHYLDITHIOCARBAMATE

AMYL CHLORIDES
DICHLORO PENTANES
o-AMYL PHENOL
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Because of their high nitrocellulose tolerance and excellent evaporation qualities these solvents have enabled many lacquer and other manufacturers to keep their plants operating when they couldn't obtain toluol. They are currently available as Class A Solvents under WPB Conservation Order M-150.

★ *Postwar grades of Tollac and Nevsol, having much higher solvency and nitrocellulose tolerance, will be available as soon as solvent restrictions are lifted. Keep them in mind for your postwar finishes.*

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A-18

• The Dry Ice Plant of Wyandotte Chemicals Corporation at Wyandotte, Michigan, is the world's largest. Each of its huge ice presses exerts a pressure of one million pounds. This, applied to carbon dioxide "snow," produces a 240-lb. cake of dry ice—140° colder than ordinary ice. Some of these cakes are seen ready to leave the presses.

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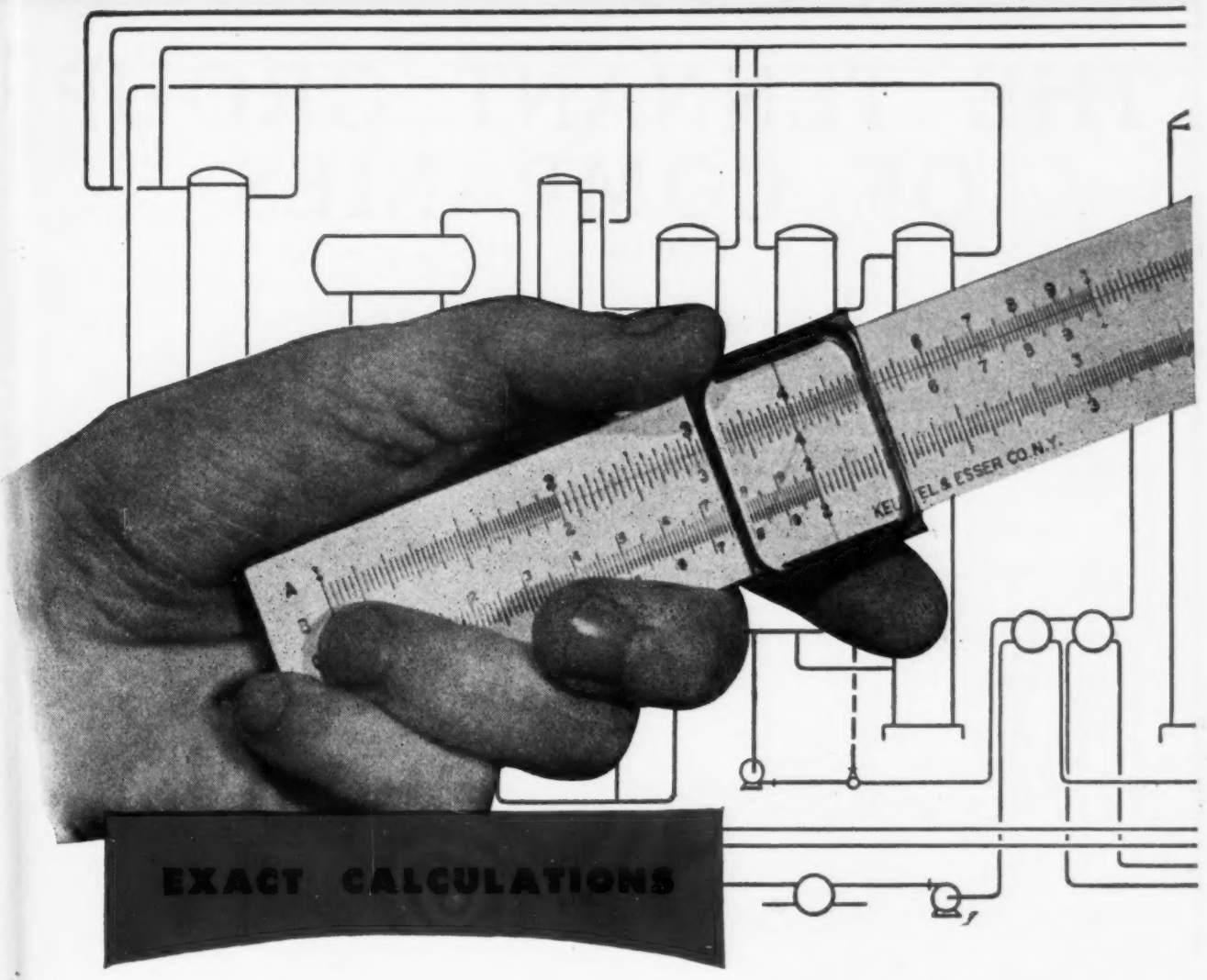
MICHIGAN ALKALI DIVISION • WYANDOTTE, MICHIGAN

Wyandotte
REG. U. S. PAT. OFF.

VITAL TO VICTORY TODAY—READY TO WORK FOR A GREATER TOMORROW



It is a tremendous advantage in developing or improving a catalytic process to know that predicted conditions of reaction and fluid flow will be maintained throughout the life of the catalyst. Engineers have this assurance when the catalyst is supported by Porocel. This permits *exact engineering design calculations.*

Porocel, an activated bauxite, has unique qualities that make it useful as a carrier for numerous solid and liquid catalysts. It is produced in granules of uniform size, which permits the dispersion or dilution of the catalyst to be *controlled* within close limits. It is chemically inert to most catalysts and organic reactants, and so cannot interfere with the basic reaction. Further, Porocel granules are rugged enough to maintain their shape under widely varying temperature and flow conditions. *And Porocel's cost is surprisingly low.*

It is especially valuable as a support for catalysts that are difficult to control when used alone. Excellent results are being obtained with anhydrous aluminum chloride when presented to the reactant phase supported on Porocel. Tests have shown that activated bauxite in many cases is a satisfactory carrier in such processes as the catalytic hydrogenation, dehydrogenation, polymerization, hydration and dehydration of many hydrocarbons. It has been successfully used to support active catalysts such as the oxides and salts of zinc, vanadium, magnesium, aluminum, molybdenum, cadmium, cobalt and nickel.

If you are trying to adapt an unruly catalyst to a commercial process, a Porocel support may be the answer. Our experience in the field and the findings of our research staff have revealed many valuable facts about the importance of the carrier in catalytic processes. We shall be glad to answer questions about difficulties in your particular operation. There's no obligation, of course. Just address: Attapulgus Clay Company (Sales Agent), 260 South Broad Street, Philadelphia 1, Pennsylvania.

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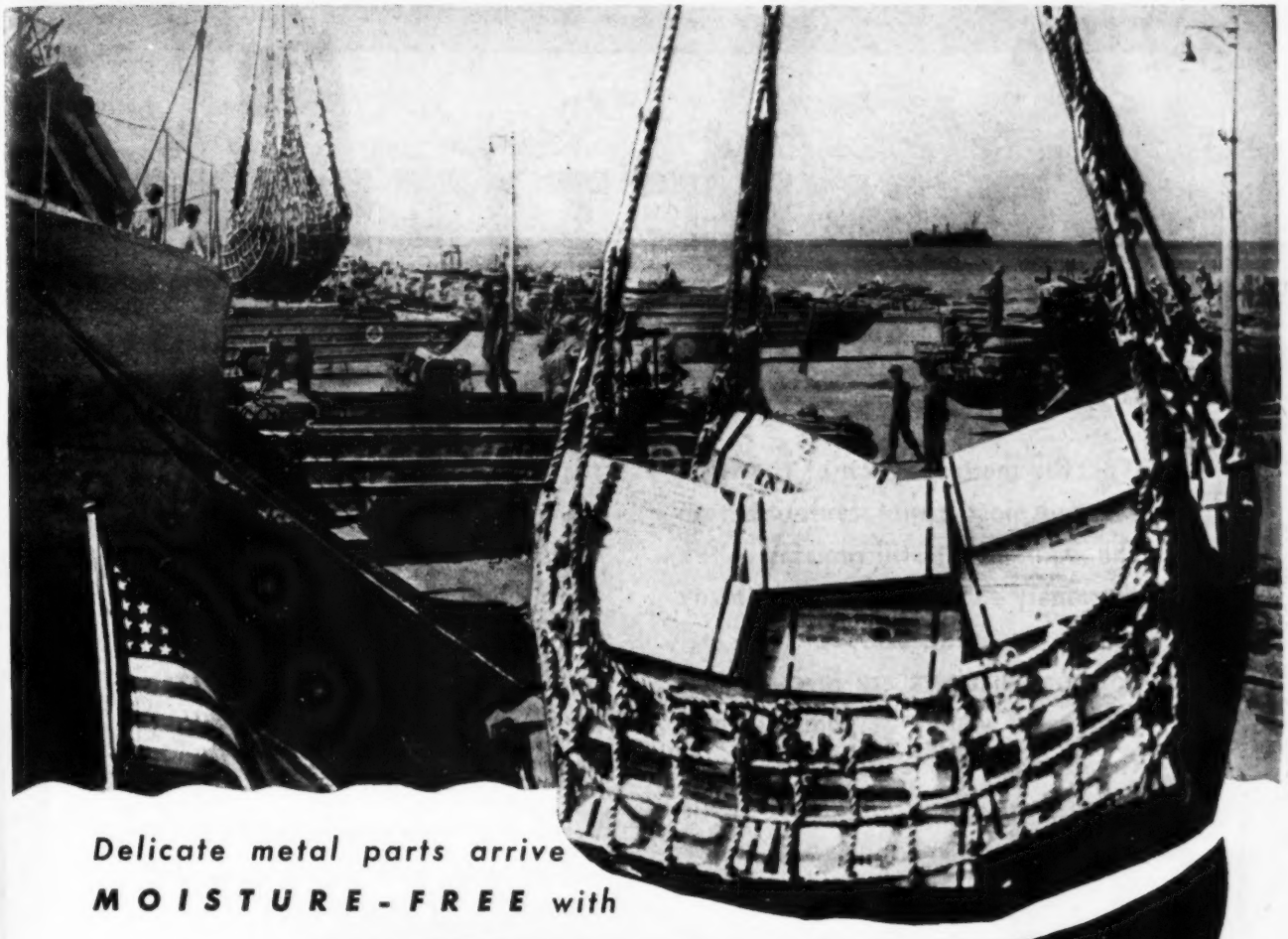

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JOLIET CHEMICALS, LTD.
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COMPETITION
- - - is an ugly word !

Yes, the mere mention of the word startled most manufacturers before the war—and it still remains in the dictionary and in the minds of many buyers for future use. Far-thinking, post-war planners are investigating sources of supply of domestic materials that will be available in sufficient quantities to meet their manufacturing schedules and priced to fit their cost sheets.

Wartime experience in the use of Red Oil, Oleic and other fatty acids as replacement materials proved that these products will answer many of the problems in post-war competition. Many industries, using fatty acids for the first time have realized that these strategic materials are doing a better job than the imported products they used before the war.

When that time comes, HARDESTY will be ready with greatly expanded facilities, and with a fund of technical knowledge and experience to contribute to solving the problems of peacetime usage.

STEARIC ACID RED OIL GLYCERINE PITCH WHITE OLEINE
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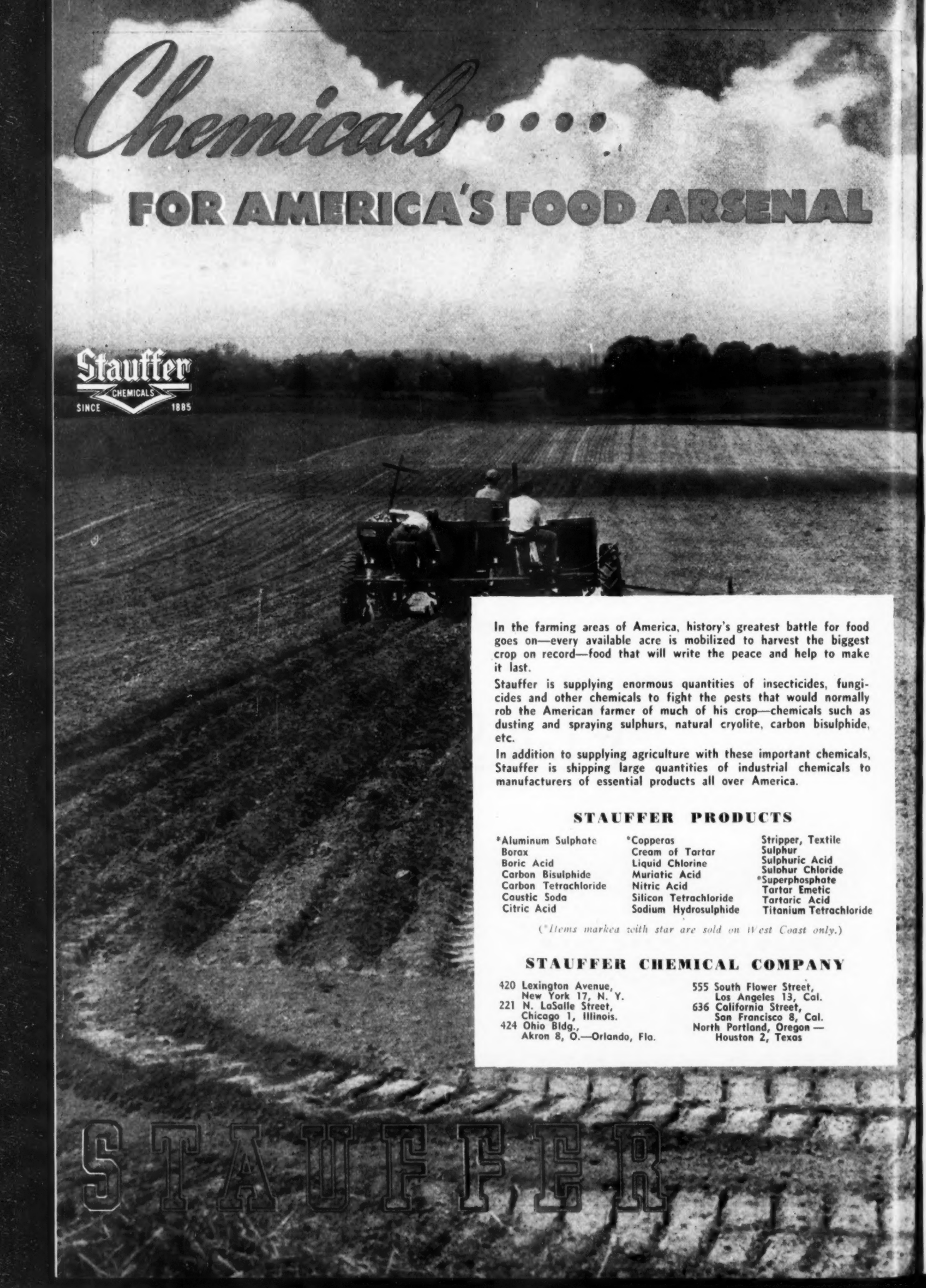
Chemicals....
FOR AMERICA'S FOOD ARSENAL
Stauffer
CHEMICALS
SINCE 1885
In the farming areas of America, history's greatest battle for food goes on—every available acre is mobilized to harvest the biggest crop on record—food that will write the peace and help to make it last.
Stauffer is supplying enormous quantities of insecticides, fungicides and other chemicals to fight the pests that would normally rob the American farmer of much of his crop—chemicals such as dusting and spraying sulphurs, natural cryolite, carbon bisulphide, etc.
In addition to supplying agriculture with these important chemicals, Stauffer is shipping large quantities of industrial chemicals to manufacturers of essential products all over America.
STAUFFER PRODUCTS
*Aluminum Sulphate
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Citric Acid
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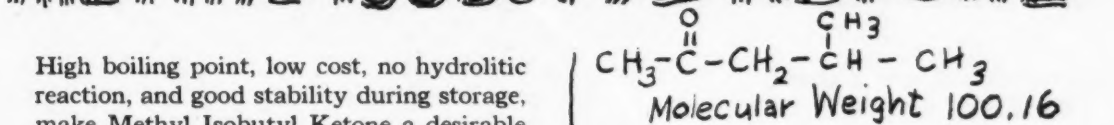
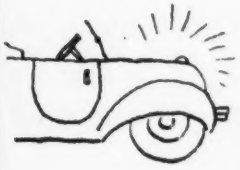
STAUFFER

METHYL ISOBUTYL KETONE



Molecular Weight 100.16

High boiling point, low cost, no hydrolitic reaction, and good stability during storage, make Methyl Isobutyl Ketone a desirable solvent for cellulose esters and vinyl resins.



MIBK is used extensively in nitrocellulose lacquers for automobile finishes and other lacquer applications including emulsion and hot spray types.

With vinyl resins, MIBK is used to formulate lacquer emulsions for paper-coatings, textiles, and leathers.

MIBK's solvent properties are particularly useful in the manufacture of shoe cements . . . as an extractive agent in the manufacture of drugs — penicillin, tannic acid, etc.

In addition to its many other industrial uses, Methyl Isobutyl Ketone is authorized as a denaturant for ethyl alcohol in anti-freeze and general solvent purposes.

Does MIBK possess qualities useful in your plant process?

SPECIFICATIONS

Purity	Minimum 99% methyl isobutyl ketone by weight
Specific Gravity 20°/20° C.	0.800 to 0.804
Color	Maximum 15 platinum cobalt (Hazen) standard
Water	Miscible without turbidity with 19 volumes of 60° Bé. gasoline at 20° C.
Acidity (other than carbon dioxide) .	Maximum 0.01% calculated as acetic acid
Distillation Range . . . (A.S.T.M. D268/33) . .	Below 114° C. None Above 117° C. None
Weight	6.68 lbs. per gallon at 20° C. (approx.)

PHYSICAL PROPERTIES

Several of the physical properties of methyl isobutyl ketone are given in the following table:

Specific Gravity at 20°/4° C.	0.8004
Boiling Point at 760 mm.	115.9° C.
Melting Point	–83.5° C.
Flash Point, Tag Open Cup	81° F.
Tag Closed Cup	64° F.
Vapor Pressure at 20° C.	15.2 mm. Hg.
30° C.	26.2 " "
40° C.	43.5 " "
Specific Heat	0.46 (20° C.)
Refractive Index, N_D^{20}	1.3958
Coefficient of Expansion . . .	0.000625 per °F.
Latent Heat of Vaporization .	87 gm. cal. per gm.

Azeotropic Data: Methyl isobutyl ketone forms a constant boiling mixture with water, containing 75.7% by weight of methyl isobutyl ketone and boiling at 87.9° C.

For further properties and uses communicate with either of the addresses below.

SHELL CHEMICAL Division of SHELL UNION OIL CORPORATION
100 BUSH ST., SAN FRANCISCO 6, CALIFORNIA
R.W. GREEFF & CO. *Eastern Sales Agent* 10 ROCKEFELLER PLAZA, NEW YORK 20. TRIBUNE TOWER, CHICAGO 11

"Expansion Joint Problems ?"

ADVANTAGES OF COOK "MAGNILASTIC" EXPANSION JOINTS

While overcoming the ten extraordinary conditions as shown at the right, "MagniLastic" offers additional characteristics which present further engineering advantages as follows:

Dependability

Performance of "MagniLastic" expansion joints has proven that with the incorporation of new designing principles and employment of appropriate metals, the expected service life is almost unlimited.

Predetermined Travel Ratio

Because of their method of construction, Cook "MagniLastic" bellows can be designed for use at predetermined travel ratios, thus giving an exact amount of travel at any required pressure. This is accomplished by employing the correct metal and through the proper designing of flanges and flange span dimensions and contours.

Resistance to Corrosion

Where corrosive factors must be considered, "MagniLastic's" use of all metals and the techniques used in joining these metals can readily overcome such conditions.

Savings in Maintenance Costs and Time

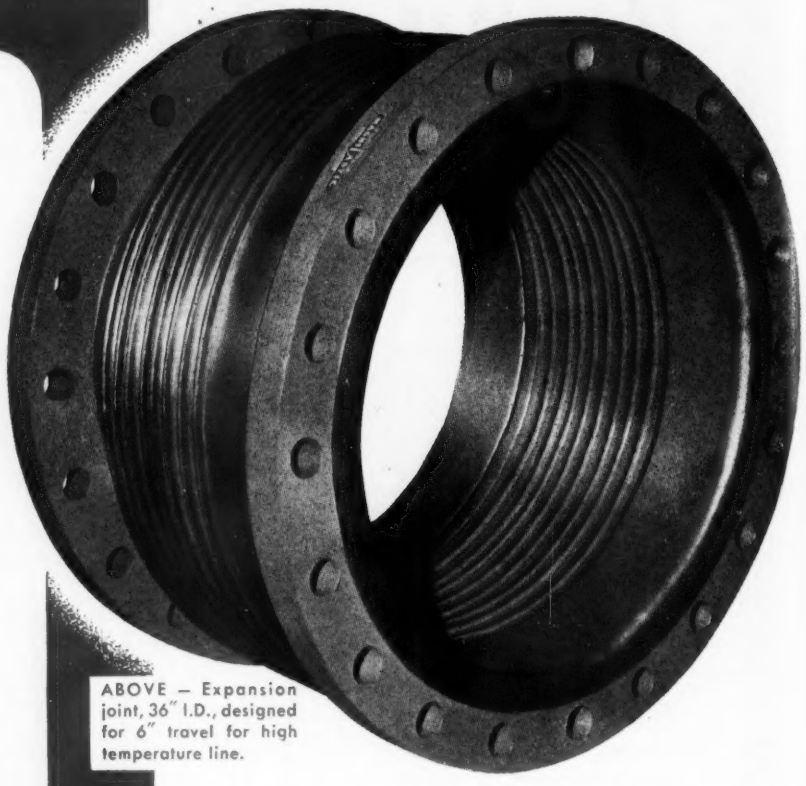
In most cases, the installation of a "MagniLastic" expansion joint means the installation of a unit whose life will exceed that of the entire project. Production loss due to replacement and maintenance is therefore, avoided.

Each Expansion Joint "Custom-Built"

Cook "MagniLastic" expansion joints are "custom-built" to meet the requirements of each specific application for which they are designed. While many of the sizes and flange types have become standard in a sense that the design itself has found repeated uses, each application is especially engineered to meet the exact requirements of the application. Each application is thoroughly examined and the appropriate metals, flange design and type of metal joining is specified in the design by "MagniLastic" engineers. Thus, each bellows is a "custom-built" job, especially suited to your needs.

All Sizes—All Shapes—Unlimited Lengths

"MagniLastic" expansion joints have been designed for service where round, oval and rectangular shapes have been required. They can be designed up to 72" in diameter and, because of their method of assembly, can be produced in unlimited lengths.



ABOVE — Expansion joint, 36" I.D., designed for 6" travel for high temperature line.

We welcome the opportunity in serving your specialized requirements. We are in a position to give you a quick estimate and furnish you assembly drawings, if the following information necessary to design the expansion joint is furnished by you.

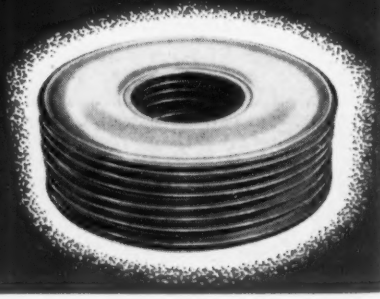
1. Sustained maximum pressure and surges to which the expansion joint will be subjected.
2. Maximum and minimum operating temperatures to which the expansion joint will be exposed.
3. Corrosion factors in terms of the nature and kind of gases or fluids with which it will come in contact.
4. Desired amount of movement whether expansion, contraction or total movement, and the estimated number of full movement oscillations to which the expansion joint will be subjected in a given period of time.
5. The limitations as to physical size and mounting or end fittings.

"MagniLastic" bellows, while generally associated with use as expansion joints, are also employed as flexible joints, bellows pistons, bellows valves, packless valves, bellows seals, revolving seals, equalizer units, flexible couplings, alignment members, swivel action joints, shock and vibration dampeners, hydraulic accumulators, dynamic actuators and many other applications.

SEND FOR CATALOG BG-2 FOR THE COMPLETE STORY OF COOK BELLOWS

Practice Packless Hydraulics with

MAGNILASTIC



RIGHT — Section of a "MagniLastic" bellows used on large packless vacuum valve. Bellows are made of Monel, atomic welded, micron tight, and have a travel range of three times their compressed length. They are used on valves up to 16" inclusive.

MAGNILASTIC *Can* Solve Them!

A bold statement . . . but here are the facts

In every case where Cook engineers have had requests for assistance, they have overcome problems of—

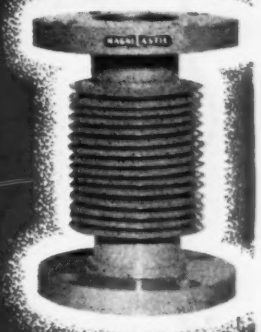
1. Extraordinary sizes or capacities
2. Abnormal temperature ranges
3. Tensile strength and creepage of metals
4. Corrosive factors as affecting flange metal or brazing and welding fluxes or materials
5. Excessive pressures
6. Porosities of metal and joints which are specified in fractional microns of vacuum or leak rate
7. Abnormal travel ranges and lateral deflections
8. Heavy duty service as imposed by shock or surges
9. Vibration factors and internal turbulance
10. Unusual limitations in flange span dimensions

Cook "MagniLastic" expansion joints were originally developed to meet specifications where the ordinary, conventional type of expansion joint just wouldn't do. "MagniLastic" bellows are different in principle, different in design and different in the type of service they will render. These expansion joints are not "crushed" together, they are formed and assembled. The patented design employs new engineering principles of design and fabrication.

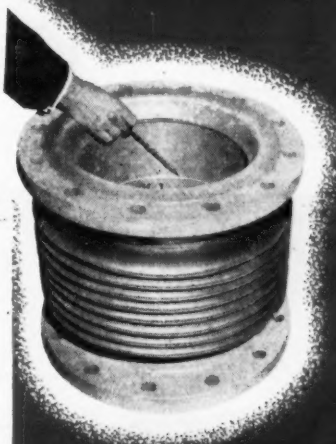
The use of all types of metals, such as nickel, Everdur, copper, beryllium copper, high tensile steels, stainless steels, Monel, Inconel, Kovar, Fernico, etc., and the use of all advanced and many secret metal joining processes, enables Cook craftsmen to produce these outstanding units. "MagniLastic" is a great stride forward in keeping pace with all of the unusual requirements necessitated by advanced processes, designs and increased production demands of all industries.

The column at the far left explains the extraordinary advantages of "MagniLastic" design and the illustrations show a few of the hundreds of new, successful developments of "MagniLastic."

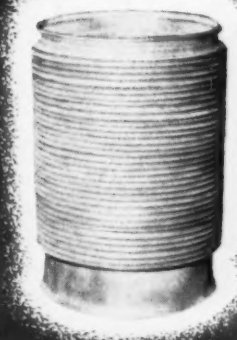
LEFT—A new vacuum and medium pressure expansion joint made of Monel metal, for pressures ranging from 0 to 55 lbs. p.s.i. Total travel is ½" on compression or expansion. Cycleage in average use upwards of 10^{11}. Temperature range —300°F. to 900°F. For corrosive gases or liquids.



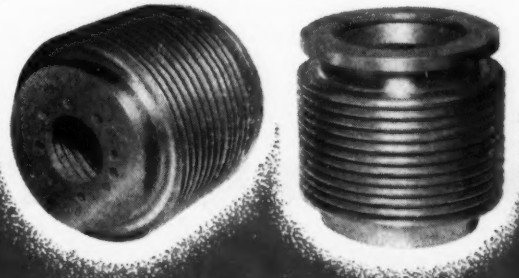
RIGHT—Special copper brazed steel heat treated bellows for temperatures as high as 500°F. For pressures up to 600 lbs. p.s.i.



LEFT—Special large size expansion joint, Vanstone lap and inner liners made of stainless steel, atomic welded and provided with series 150 end flanges. This expansion joint was designed for use on a 550°F. line, 150 lbs. pressure p.s.i.



RIGHT—High temperature narrow span exhaust bellows for absorbing the expansion of exhaust piping systems used in Diesel aircraft and similar high temperature lines suitable for temperatures of 1700°F.

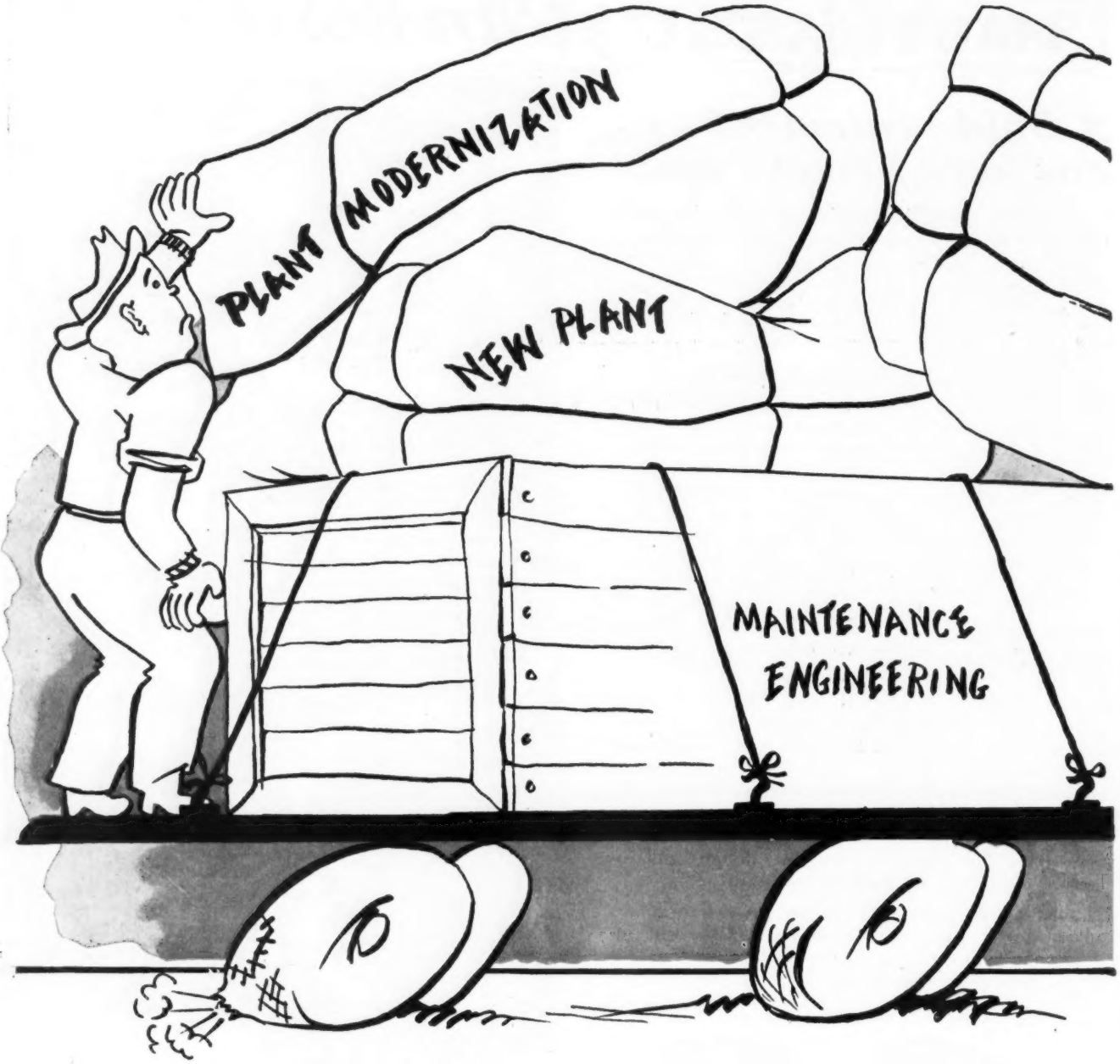


ABOVE—Welded Inconel expansion joint with special end fittings. This expansion joint was designed to meet critical corrosive conditions for a special restricted application.

COOK ELECTRIC Company

SINCE 1897

2700 SOUTHPORT AVENUE CHICAGO 14, ILLINOIS



GOING OUR WAY?

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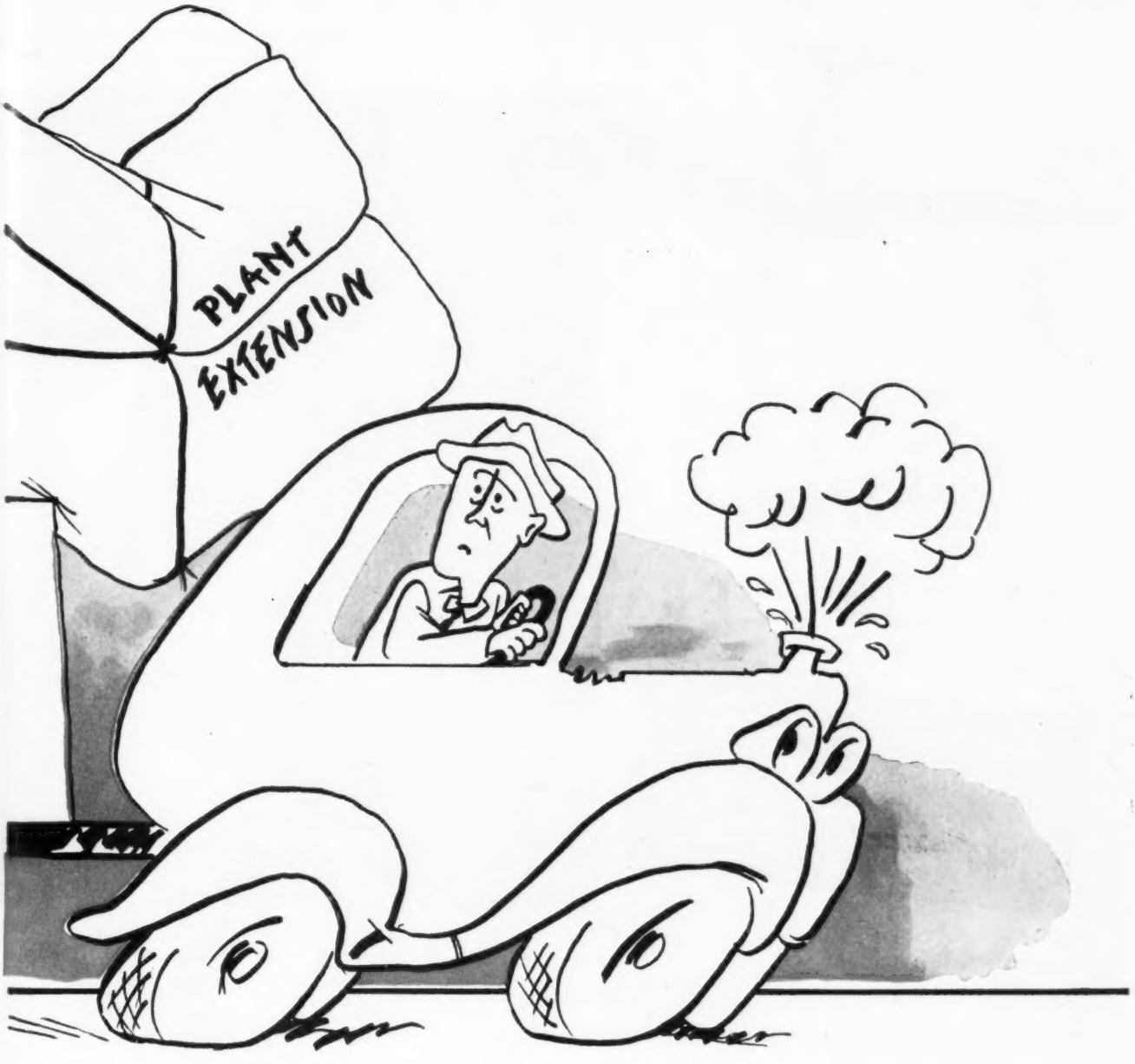

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The engineering departments of most petroleum refining, petro-chemical or chemical companies are streamlined for normal needs . . . for maintenance and a nominal amount of auxiliary construction.

But sudden "peaks" can be serious. The added responsibilities of a major conversion or new-plant construction project may overload a regular engineering department unnecessarily. Overloads can quickly accumulate to unwieldy proportions. And assembling, qualifying and integrating an extra force for the occasion is not easy, especially in these days of professional manpower shortage.

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Badger—a large, flexible, and long-experienced organization—has "all the tools." Badger's sustained flow of assignments enables us to maintain permanently a complete, widely trained force of process, design and construction engineers—together with staffs of purchasing, expediting, inspection and construction men.

Plant additions, processing units, re-equipment, modernizations, or complete new plants of any size—Badger can take them "in stride," with minimum dislocation of your current routine, with over-all economy, and with the assurance that the job will be brought through to early completion and successful operation.

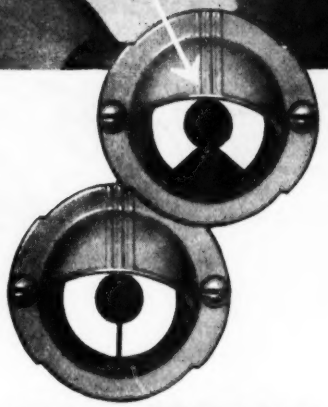
We invite discussions—now.

THE GLENN L. MARTIN COMPANY
MANUFACTURER OF AIRCRAFT
EMPLOYS THE

Fisher TITRIMETER

"for exact chemical analysis by titration—eliminating the error which exists when the human eye alone is used."

THE TITRIMETER SAVES TIME in the determination of chromium and vanadium in steel at the laboratories of the Martin Company in Baltimore.



THIS EYE NEVER WINKS AT IMPERFECTION, but it blinks unmistakably, as illustrated, at the exact end point.

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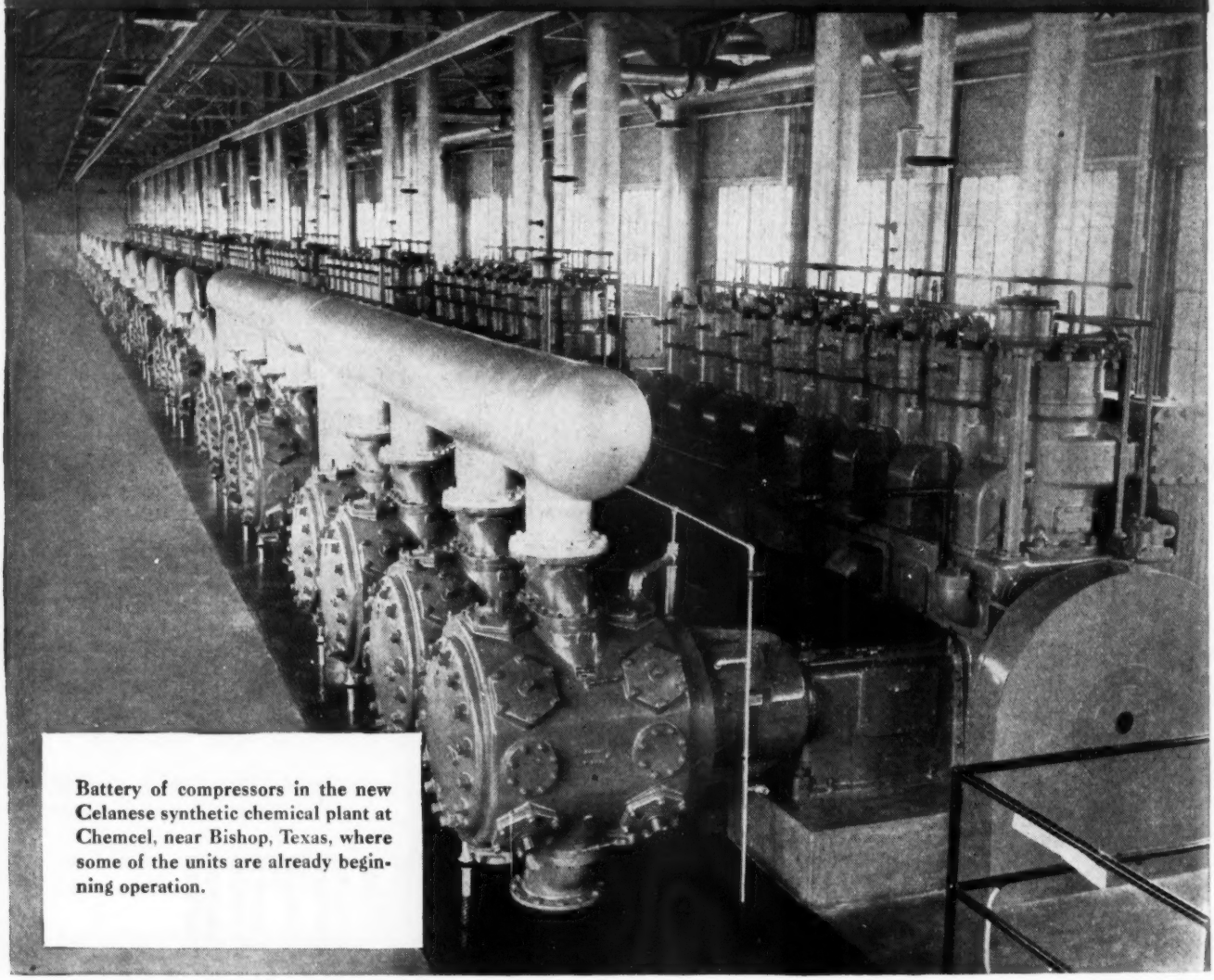

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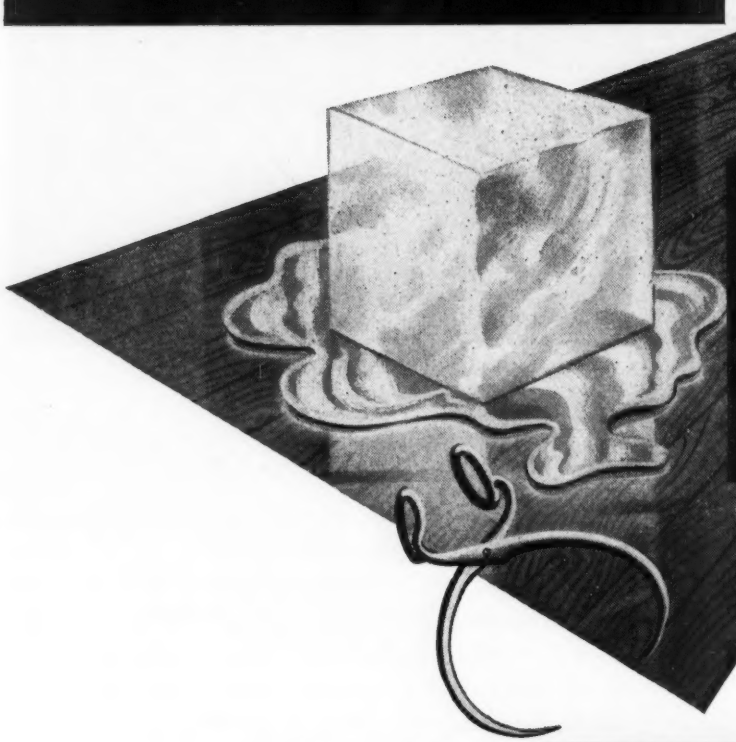

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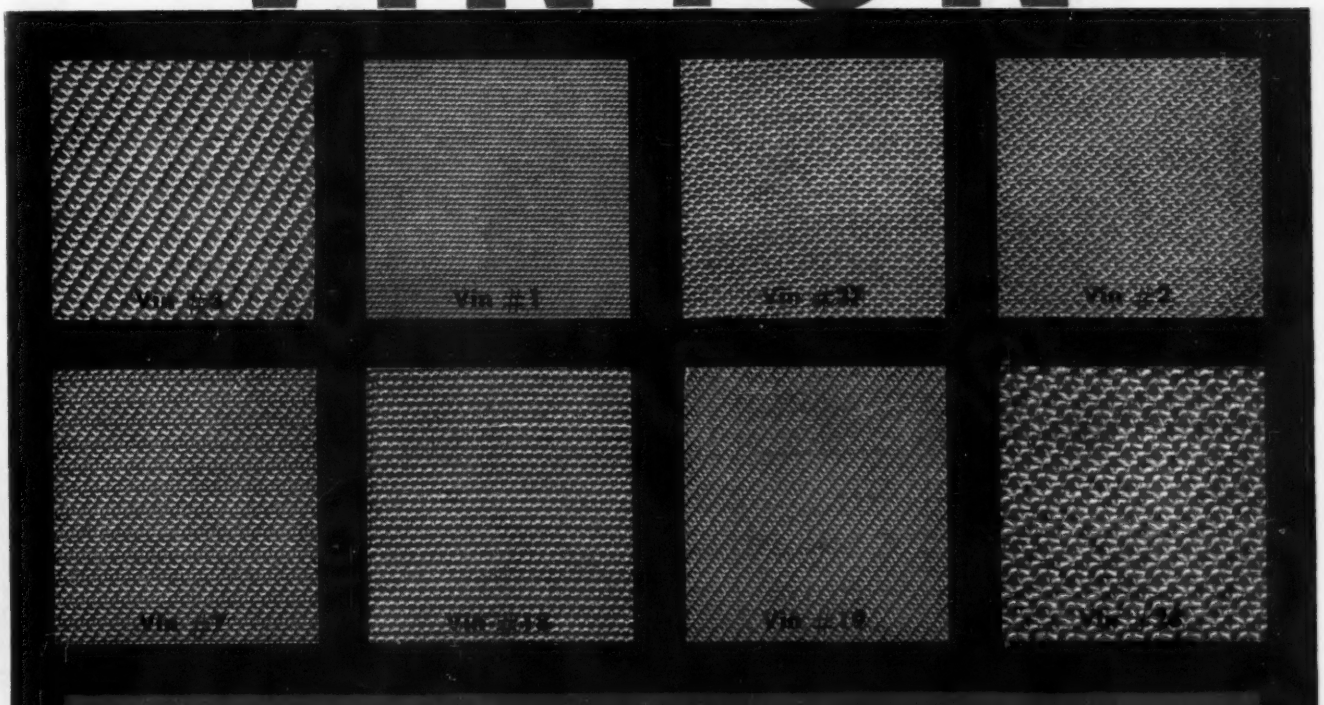

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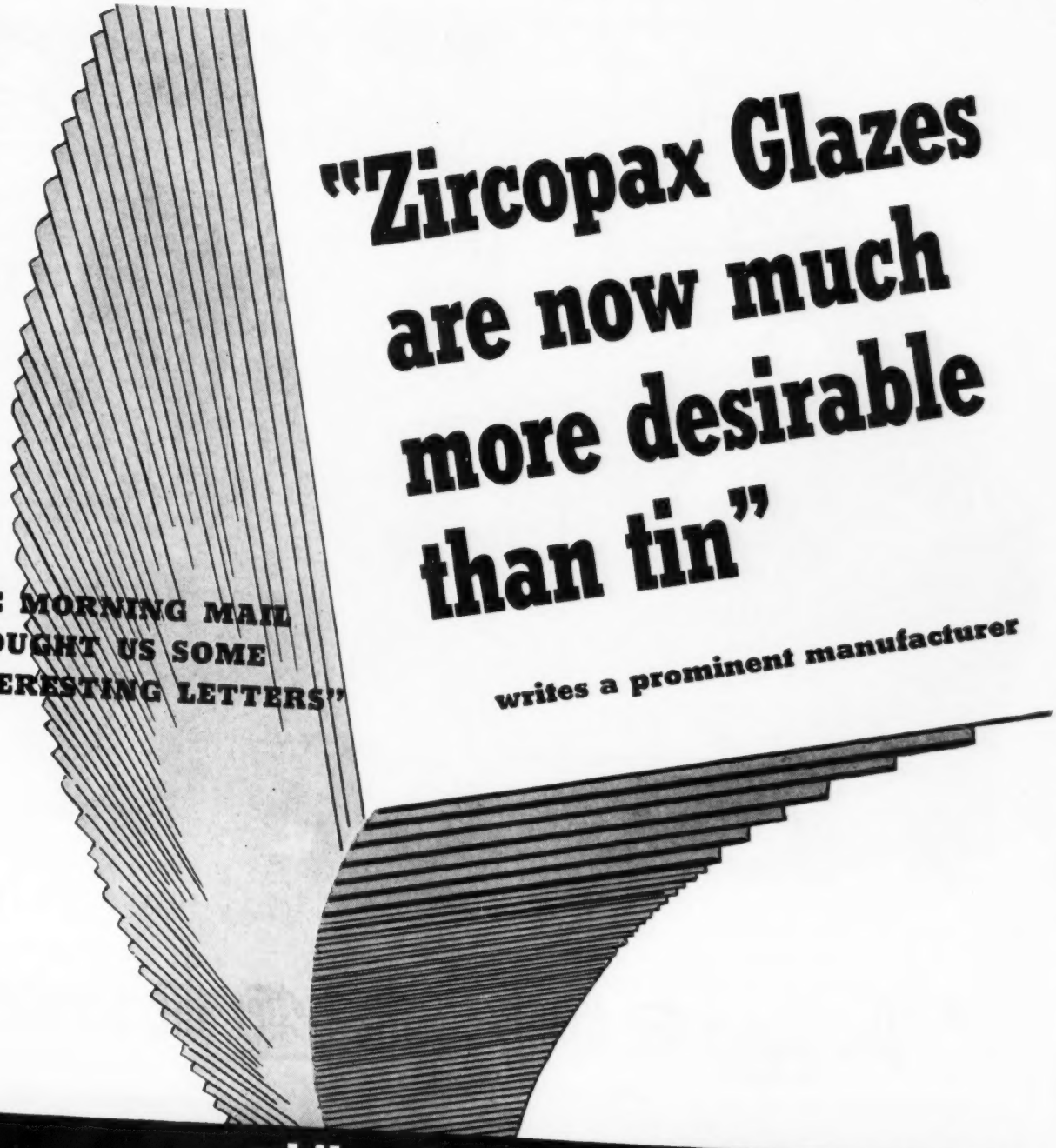

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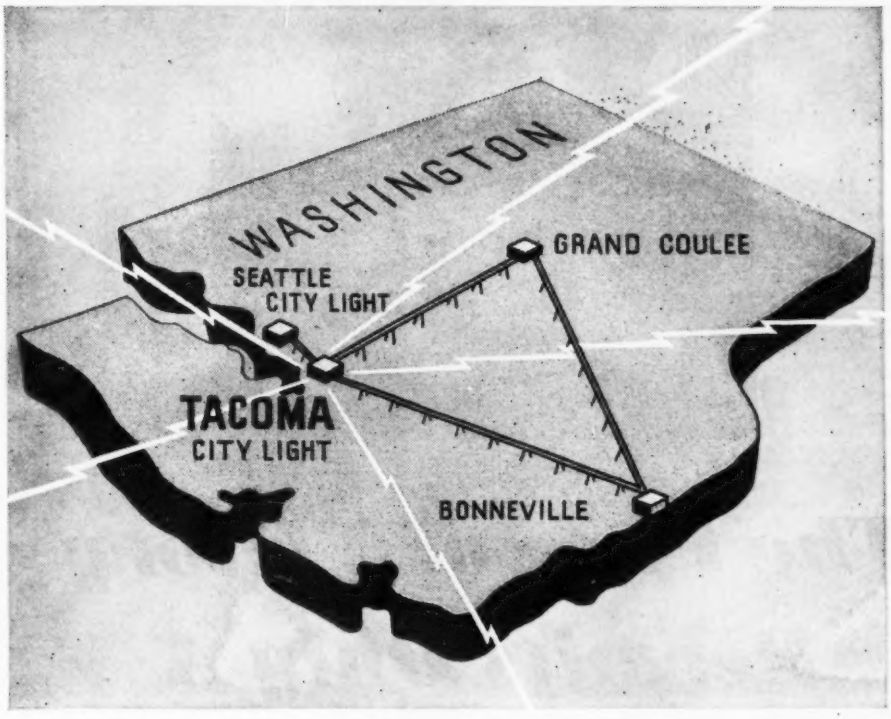

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The Treasury Department acknowledges with appreciation the publication of this message by

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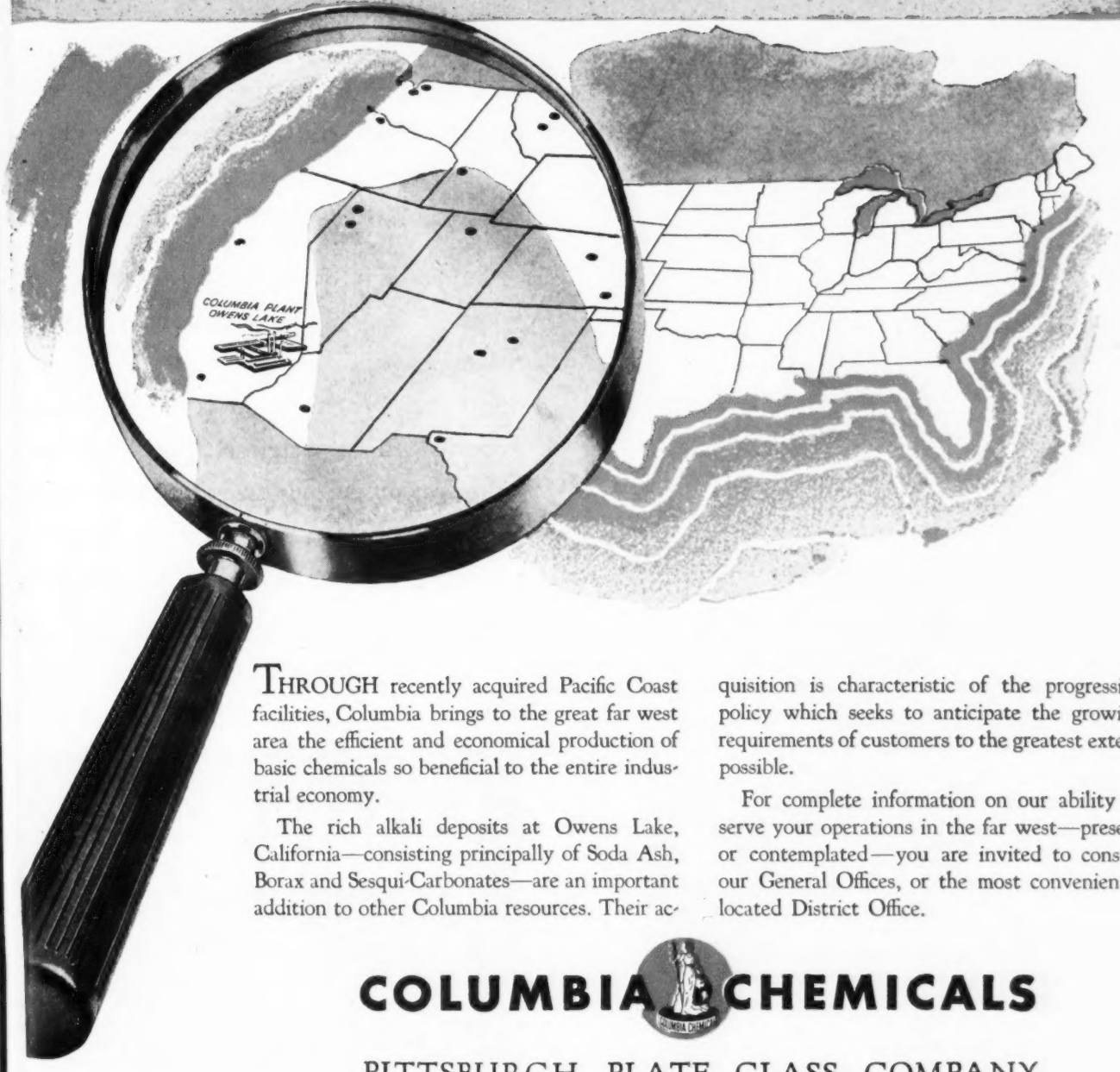

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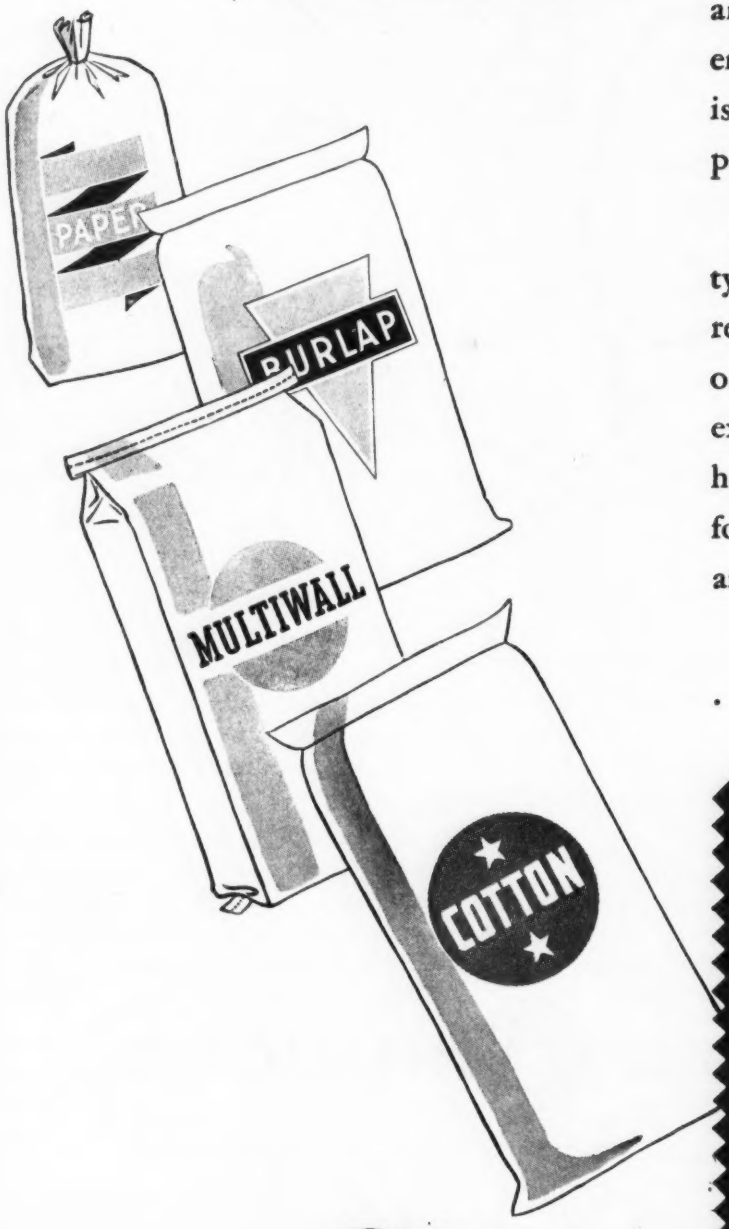

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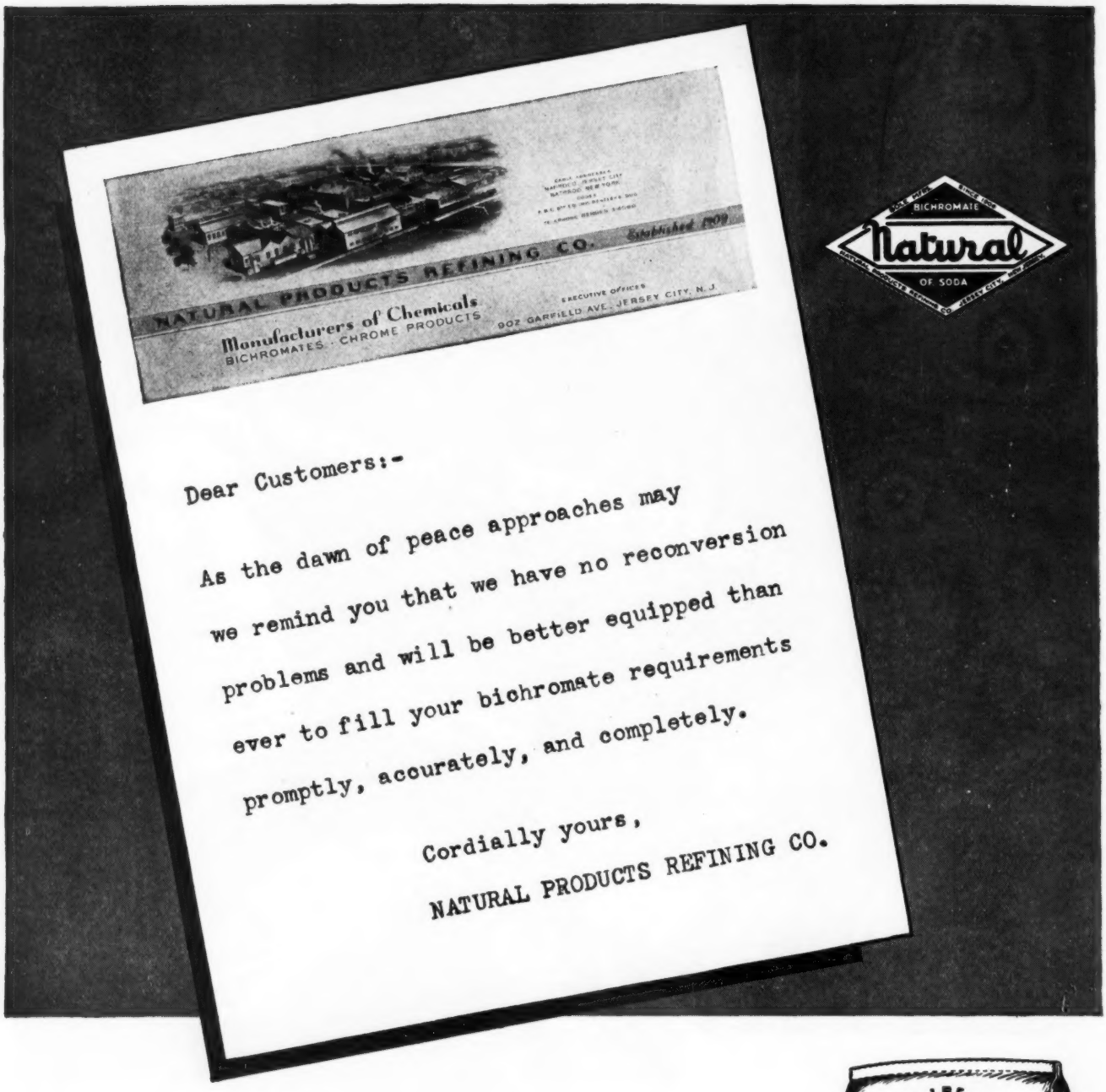
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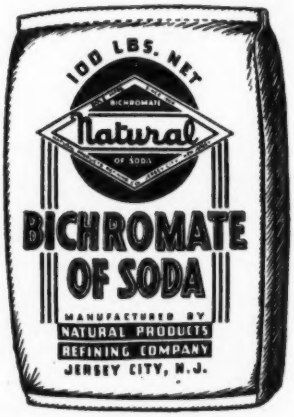


Natural BICHROMATES

Chemical Reconversion

by ROBERT L. TAYLOR, editor

THE OPINION HAS FREQUENTLY BEEN EXPRESSED that the chemical industry has no reconversion problem, that it will continue to make the same products in the same plants for civilian consumption that it is now making for the Army and Navy.

While this is basically true, it oversimplifies a situation which many chemical producers are already finding is not so simple.

The chemical industry is going to have reconversion problems. Physically, they will not approach those of the auto and toaster makers, but they promise to be sizable enough and of such character as to warrant some advance thought and preparation.

It is first of all necessary that chemical reconversion be considered in relation to the reconversion of industry as a whole. And overall reconversion in turn is tied in directly with the military and political pictures. This means, among other things, that reconversion problems now are considerably different from what they will be after the Japanese war. Now, the problem nationally is to maintain required military production in the face of rapidly decreasing attractiveness of military contracts and increased anxiety on the part of manufacturers to get in early on the jockeying for civilian markets.

A few chemical producers are already facing this situation. Others expect to be shortly. And lifting of most of the chemical control orders by the end of the year, as predicted by Lawrence Brown, WPB Chemicals Bureau reconversion administrator, probably will not make the job any easier.

Continued scarcities of certain chemical raw materials and intermediates is another foreseeable problem. Some of these materials are reported by the WPB Chemicals Bureau to be in such short supply that cutting back of military requirements will have no perceptible effect on their general availability for some time. Lessening of demand by one military project will only make them available for another of lesser priority.

How serious this factor will be throughout the industry will depend on conditions surrounding individual cases, but it is altogether likely that some chemical producers freed from war orders will find themselves unable to get materials to proceed with civilian work, even though no change in product, or other reconversion obstacle, is involved.

Where raw materials are available, necessary plant alterations or expansions may be a temporary problem. The pent-up demand for new plant construction in the chemical industry is so great that it cannot possibly be filled for some time. Here WPB has already made provision for what it hopes will be an orderly method of handling. Three basic kinds of civilian plant expansion will be allowed: (1) relatively minor expansions of established facilities; (2) new plants required to break an industry bottleneck in getting civilian production under way; and (3) new plants for an established product which is "an essential item serving basic needs of the population." Though possibly as adequate as could be provided, the last definition is subject to broad personal interpretation and doubtless will yield some unpopular decisions.

These are but several of the problems that would seem at this time to lie ahead to plague chemical producers. Those who will plan ahead with their own requirements in mind should be able to avoid some of them.

Don't Dry Up the Source

IN THE YEARS IMMEDIATELY AHEAD, when good technically trained men will be in far greater demand than they can be supplied, industry must not overlook one important responsibility. That is the fact that colleges, too, will need good men.

If chemical industry does not want to dry up the source of two of its most valuable assets—fundamental knowledge and technical brains—it will adopt some such plan as that recently suggested by Dr. R. K. Stratford of Imperial Oil, Ltd. For every ten men engaged on applied research in industry, recommends Dr. Stratford, industry should maintain one man on fundamental research in a university.

Training is Not Expendable

WE, AS WELL AS MANY OTHER SPOKESMEN for the chemical industry decry the injudicious drafting of technically trained men into the services, particularly in those instances—and these constitute a majority—where their scientific training is not effectively employed.

We also deplore the fact that we are losing a whole generation of scientific manpower while our more astute allies are continuing to augment their armies of research personnel. Five—ten—even fifteen years from

now we may find ourselves handicapped in competitive industry by our shortsighted policy during the war.

This lamentable situation has led Dr. Lee Irvin Smith to point out that "there simply will not be an adequate supply of Ph.D. men. . . . [and] by 1955 there will be accumulated deficiencies of about 3,600 Ph.D. men in chemistry. . . . It will require the presence of every first-class, interested mind we can find for the next 20 years to make up such deficiencies as these."

But one important point, which is instantly apparent to observers of research operations, seems to have been neglected by all commentators: How effectively does industry use its scientific manpower?

One Ph.D. in organic chemistry worked two years in a large industrial organization taking the kinks out of a calendering machine.

Another, after working six months in another research laboratory, had run one distillation. The rest of the time he was plying wrenches and turning valves —doing work where his intensive training in organic research was completely wasted.

Still another Ph.D., trained in physical chemistry, quit because his employer insisted on engaging his time in organic problems about which he knew little.

Many others, who by winning their Ph.D. degrees have proved their ability to do independent and imaginative research, are nothing more than glorified lab boys—extra pairs of hands for their group leaders.

Norman A. Shepard, chemical director of the American Cyanamid Company recently said, "It is unfortunately true that some of the junior laboratory executives, and I have even seen it in senior executives, deliberately keep their men in the background, so they, themselves, will not be outshone and can take to themselves all, or most, of the credit belonging to their men.

"It is highly advisable that each investigator be permitted a certain percentage of his time to work out his own ideas. . . . As Willard Dow has said: 'We have learned that if a research laboratory is to produce results, the men must be allowed the freedom to be a bit crazy.'"

Possibly the indiscriminate use of high-caliber men in menial positions, denied access to adequate untrained help even to the extent of washing their own glassware and writing reports in longhand, arose during the depression years when Ph.D.'s were a dime a dozen. Then it was good business, of course, to hire a man of proved ability for $150 instead of an untrained person for $75. That day has passed, however, and now the uncritical use of intensively trained men is not only a needless waste of manpower, but also an affront to the professional reputation of the man himself. Let us be sure we are using our men effectively before we clamor about the shortage.

News Note

THE GERMAN SCIENTISTS who were responsible for development of the V-2 have been found to be a group of young engineers, chemists and physicists between the ages of 25 and 30.

"I Want to Get into Chemistry"

THE IMPACT OF SPECIALIZED STUDY on modern industry is so great that the lay public cannot be expected to understand its complexity. The manufacture of almost every commodity—book ends, shirts, automobiles—requires expert knowledge in one or more branches of science.

Under these circumstances it is a little sad that some persons, many of them successful in other occupations, look forward to making a fortune in plastics, synthetic rubber, or some other branch of the chemical industry. This bright and futile hope is so prevalent, in fact, that it has led George K. Scribner, president of the Boonton Molding Co., to point out the pitfalls in these precious dreams:

"These enthusiasts seem to be convinced that the plastics boys have been engaged in a simple business like raising radishes for a few years and have now struck oil in the south meadow. . . . Some have even taken a short course in plastics—150 hours and they're all set to knock the world cold—and come in with an And-Now-What-Is-Your-Problem approach."

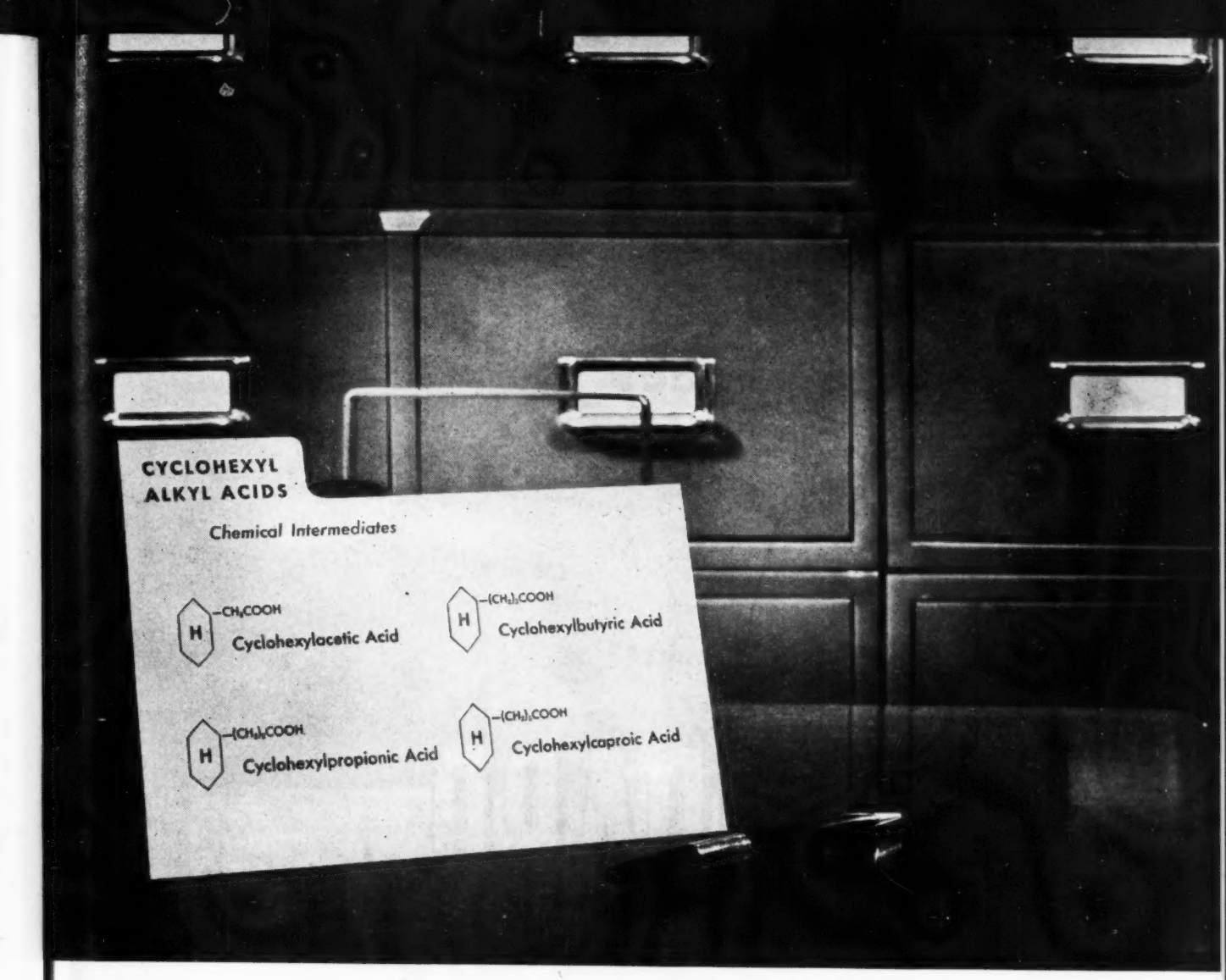
He also scores those humanitarians who endeavor to help the "common man" by getting him into business for himself.

"Postwar planners run around the countryside suggesting to one and all that if they can't see a rosy future in their own business they might shift to the bright business-of-the-future, plastics. The Smaller War Plants group have a tendency to offer the same advice. The other fellow's field is always greener and more nourishing, and no thought is given to the skill and experience that made it so."

It would appear that in spite of all that has been said or written, there are still those who are not aware of the time and intensive study that goes into a chemist's professional knowledge—without which no company making chemical products can hope to survive in these competitive times.

We're On Top—Will We Stay?

THE MYTH OF GERMAN SUPERIORITY in chemistry and chemical engineering—if it still exists—should certainly be exploded once and for all by the reports that are now beginning to come back from the American technical investigating committees in Germany (see pages 74 and 75). The operating efficiencies of the German synthetic rubber plants, excluding the effects of bombings, were found to be well below efficiencies being regularly obtained in this country on similar processes, and this despite the fact that the Germans had a head start of a decade or two in this field. In motor fuels also, we are reported to be well out in front of the Germans. It will be a tragedy indeed if American leadership in science and industry is lost through the shortsightedness of a few militarists and politicians who are blocking the way to military deferments for qualified students in science and engineering.



. . . from the Dow library of special chemicals

Here is a group of compounds that may prove valuable to you . . . four cyclohexyl alkyl acids that show considerable promise as chemical intermediates. Look over their specifications below . . . then consult the Dow technicians about their application to some of your problems. Dow will gladly furnish samples for study in your own laboratory.

SPECIFICATIONS

Compound	Distilled at	Freezing Point	Color
Cyclohexylacetic Acid	129°/10 mm.	>28.5° C.	Cream to white
Cyclohexylpropionic Acid	144.5°/10 mm.	15.0° C.	White to lt. straw
Cyclohexylbutyric Acid	154°/10 mm.	>29° C.	Cream to white
Cyclohexylcaproic Acid	177°/10 mm.	>32° C.	Cream to white

All these acids dissolve completely in dilute alkaline solution (5 cc. acid + 50 cc. water + 3 cc. NH_4OH or NaOH). They are miscible in all proportions with diethyl ether, benzene, carbon tetrachloride, acetone, 95% alcohol, chloroform, chlorbenzene, and petroleum ether.

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Chemical Industries
JULY, 1945

The Development and Production of ROCKET PROPELLANTS in World War II

by HENRY N. MARSH, Manager, Smokeless Powder Operations
Hercules Powder Co., Wilmington, Del.

HERE FOR THE FIRST TIME is the chemical story behind the epic development of military rocket powder production in this country from virtually nothing in 1942 to the vast flow which helped destroy Germany and is now doing the same to Japan. The powder currently in use is a solventless nitro-cellulose-nitroglycerine smokeless type which was developed from and is similar to that used in trench mortar shells in the beginning of the war.

IN THE host of new developments of this war few have attracted so much public interest as rockets. This interest has been kept active by the increasing use of this weapon in many forms by our Allies, our enemies, and ourselves. It is, of course, incorrect to speak of rockets as a new development since they were used in warfare even before guns—there are records of their use by the Chinese as early as A. D. 1232 while guns were first used about 1300, if the records are to be believed. These early rockets were mostly of incendiary types and were not too effective. The modern military use of this type of weapon begins around A. D. 1800 when Sir Wm. Congreve developed rockets for the British Army to meet a like use by the opposing Indian troops. They were used at Leipzig and Danzig in 1813 and by the British in their war with us in 1812 as is mentioned in our National Anthem. This Congreve rocket resembled the Fourth of July skyrocket of our childhood and like it was stabilized in flight by a trailing stick.

An improved type stabilized by rotation was described in the Ordnance Manual for 1862 and was used with some success in the War between the States.

During the period from 1865 to 1915 there was little interest in rockets except for pyrotechnics. Two technological advances during that period deterred immediate development in this field, but ultimately proved to be important contributions to rockets as we have known them today—(1) the discovery of smokeless powder with its higher energy content than previously used black powder, and (2) the metallurgical advances which made high strength alloy tubing of relatively low weight available for use as containers for the fuel.

There was no use of this type of weapon in World War I but interest continued in the possibilities of rockets for scientific investigation and for military purposes during the period from 1915 to 1939, evidenced by experimental work carried on by Dr. Goddard of Clark University sponsored by Smithsonian Institute, by Colonel (then Lieutenant) L. A. Skinner at Aberdeen Proving Ground, and by Parsons and Malina, two members of the American Rocket Society working at California Institute of Technology in the Guggenheim Aeronautical Laboratory.

Some of the developments in this field in the United States during World War II and more particularly the manufacture of propellant or fuel for the modern military rocket will be discussed. The term "rocket" will be used as is done in military terminology to refer only to a self-propelled projectile carrying a fuel of sufficient oxygen content to require no outside air for its combustion. No attempt will be made to discuss devices such as the German V-1 buzz bomb operating by jet propulsion under some adaptation on the Whittle design.

THE PROBLEM

At the beginning of the present war adequate smokeless powder manufacturing facilities existed for commercial requirements and the very limited military demand. Two general types of composition were manufactured: "single base" powder, consisting of colloided nitrocellulose with a stabilizer and various modifying chemicals present, and "double base" powder consisting of nitrocellulose and nitroglycerin as the energy producing elements, again colloided with a stabilizer and other modifying chemicals present. All of the smokeless powder was produced by a solvent process where the colloiding action takes place through the action of a mixture of organic solvents which are later removed and recovered after the powder has been granulated. There was one exception in the production of a small quantity of solventless powder for use in trench mortars in the form of thin sheets about 0.008" thick. This small operation had a very considerable influence on the rocket powder development and will be mentioned again later.

Early in the war the press carried references to new weapons being used by the Russians on their "Stormovik" plane and to antiaircraft defenses of Moscow which were entirely different from normal antiaircraft guns. It was also known that in the later phases of the Battle of Britain the London defenses had been im-

This article has been cleared by both the War Department and the Navy Department.

A woman operator empties a can of paste, primarily nitrocellulose and nitroglycerin, into a machine, which will roll it out into a sheet.

In the slitter and carpet roll house, the rocket powder is cut into long strips, as shown above, and wound into a round carpet roll.

proved by the use of rockets. The U. S. Army Ordnance Department was actively interested in these innovations and had initialed some experimental work at its Aberdeen Proving Ground. In 1940, however, the National Defense Research Committee established the Jet Propulsion Research Laboratory at Indian Head, Maryland, to undertake fundamental research and the development of rocket ordnance. The work of this laboratory was supervised by a joint Army-Navy-NDRC committee. In late 1941 the NDRC expanded its program by contracting with the California Institute of Technology in Pasadena for fundamental research investigations and the development of rocket ordnance of interest to both Services, primary attention being given to rocket weapons for the U. S. Navy. Early in this experimental work it was recognized that a new type of powder would be required. The solvent type powders then being produced for use in orthodox "guns" did not meet all of the following requirements for a satisfactory rocket propellant:

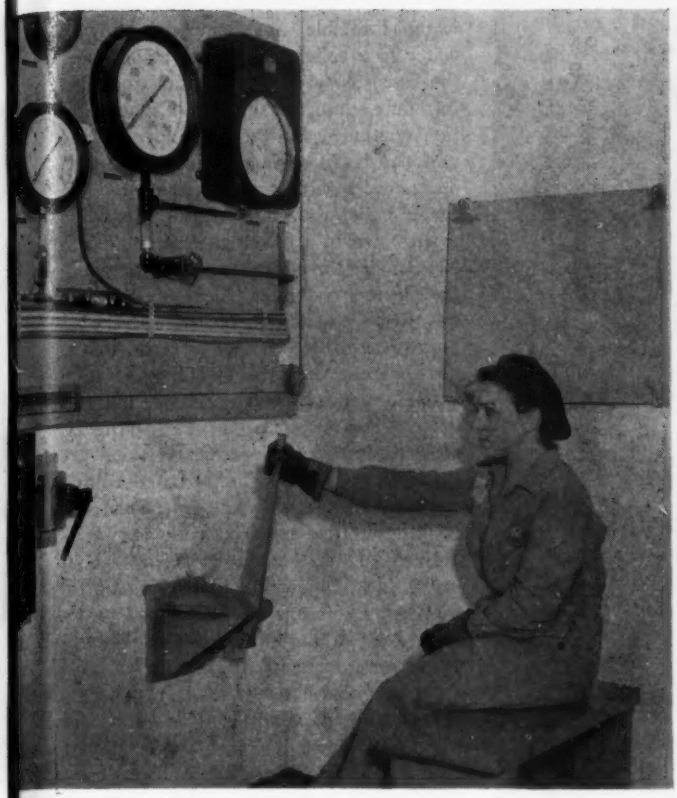
1. It must give a relatively long burning time—a rocket differs from a gun by virtue of its carrying its source of energy and its combustion chamber while it is in flight. Maximum velocity is obtained by extending the time of application of gas pressure over as long a period as possible which in turn keeps down the weight of metal in the chamber by reducing the pressures that the chamber must stand.
2. It must burn at a uniform rate—it is essential that the rate of gas production remain steady during the entire period of operation.
3. It should be smokeless.
4. It must function at relatively low pressure—the walls of the rocket motor must be as thin and light as possible in order to permit the carrying of the maximum "pay load" of explosives in the war head.
5. It must function satisfactorily over a wide range of temperatures.

THE DEVELOPMENT

The Army and Navy work proceeded independently and along widely divergent lines. The Army first developed rocket propulsion of a light weight projectile as an antitank weapon using solvent-process powder. This development was an immediate success in the form of the "Bazooka," the anti-tank weapon which helped turn the tide of battle when Rommel was rampaging across North Africa towards Alexandria. The launchers, available just when this campaign reached its most critical stage, were flown to North Africa and used there with excellent results. The Bazooka and the new tank destroyers, in this, their first use, gave such increased and effective fire power that Rommel stopped at the Egyptian border.

The limitations of the solvent-process prevented the use of this method of manufacture for the production of propellant units much larger than those made for the Bazooka. It is difficult, if not impossible, to remove all of the solvent from large web grains. This violates the second requirement listed because the presence of solvent reduces the burning rate of the powder and the layer containing the most solvent is at the greatest distance from a surface. The first requirement would also be violated because of the inability to remove solvent from a web of adequate thickness to give the desired long burning time. Despite these limitations, the Army program was worthwhile since it used existing plants, could be available in least time and helped to turn the tide in North Africa. This type of solvent-process material has been used successively in larger weapons up to the Army 4.5 inch rocket and composition changes have served to improve materially the performance of the type. There is, however, little hope of extending the solvent-process to the manufacture of grain with web more than ½ inch. The developments in this field were conducted almost entirely by the Smokeless Powder Development Group at the Kenvil, N. J., Plant of Hercules Powder Company in collaboration with the Army Ordnance Department and later with the National Defense Research Committee.

Early in the NDRC program at the California Institute of Technology which was directed towards the development of weapons using solventless extruded propellant grains, Hercules Powder Company supplied California Tech. with material of the same composition as was mentioned earlier—thin mortar sheet—the only solventless powder being made in America. As early as March, 1942, this material had been successfully extruded into thick web rocket propellant grains by the Cali-



The rolls are placed in a hydraulic press, operated by remote control as shown above, where pressure to 5,000 lbs. per sq. in. is applied.

After the hydraulic press has forced the charge of rocket powder into long sticks, the device shown here cuts them into required lengths.

fornia Tech. workers who had designed and constructed several sizes of large vertical extrusion presses.

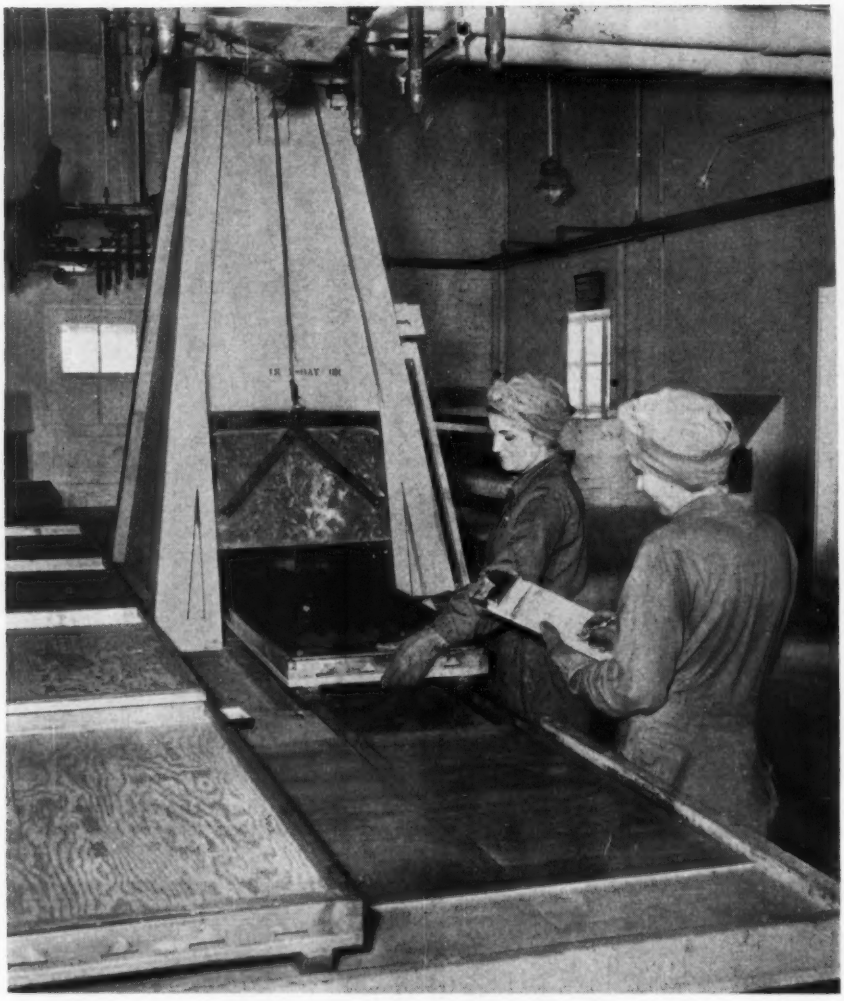
The Army was also interested experimentally in the solventless process because it early recognized the limitations of the solvent process and in October, 1942, sent a mission to England, headed by Major Harrison O. Parker and accompanied by Dr. Robert W. Cairns, then director of the Hercules Experiment Station, and Mr. David S. Bruce, of the Hercules Explosives Department, now technical director of Sunflower Ordnance Works, to acquaint themselves with the solventless process developments there. The British Ministry of Supply was most cooperative and permitted the mission to visit all of the various establishments in this field and presently made available one of their large presses which was installed in the Development Pilot Plant at Hercules-operated Radford (Virginia) Ordnance Works. This plant duplicated much of the British practice, modified in many essential features to apply American technique and to increase output.

The British Ministry also sent three technical aides to help install equipment supplied and these men stayed in America for some time and were invaluable in the rapid, safe expansion of this type operation and in training of operating personnel.

EXPANSION PROBLEMS

About the time the Pilot "A" Plant began operations, Army Ordnance accepted a requirement under Lend-Lease

Here in the inspection house, women using delicate instruments carefully check the rocket powder for dimensions of the sticks and uniformity of the powder grains.



These women are completing another step in the inspection of the finished rocket powder, which is to X-ray each grain for the detection of defects lying beneath the surface.

to supply the needs for this type of propellant to Russia according to their specifications and Hercules Powder Company was directed to design, construct, and operate a plant of considerable size, the Sunflower Ordnance Works at Lawrence, Kansas, to meet this Russian requirement. The problem was colossal. With only a few weeks of pilot plant operation on one type of product, they were asked to expand the operation thirty fold on a somewhat different product. No delay could be tolerated as the Germans were driving towards Stalingrad and the Russian plants for this work were in territory already occupied. The change order directing this work was issued August, 1942, and the plant turned out the first product August, 1943, and was in capacity operation by December, 1943. The plant designed, while far from perfect, was a workable one and many improvements have been since added. After completion of the allotment to Russia, this unit was converted to process the propellant which by this time had been adopted by the Navy as a result of the development work done at California Tech. At this site and others the production has been multiplied 15 times. The basic design used in all these amplifications has been the same but each new unit incorporated all improvements in practice that had come with quantity production.

The composition in current use does not vary much from the original trench mortar powder except in the change of two of the modifying chemicals to produce better stability, longer life and improved performance.

THE SOLVENTLESS PROCESS

The process as now practiced may be outlined briefly as follows: the nitrocotton is manufactured to close tolerances as to nitrogen content, fineness, viscosity, solubility in ether-alcohol and stability, and is delivered to the mixing operations with a high but constant moisture content. It is delivered into a mixer tank with cone agitator and slurried up with ten times its weight of water. The required amount of nitroglycerin is introduced into the slurry through a lead distributor delivering it drop wise so it will be taken up immediately by the nitrocotton.

The modifying chemicals which are water insoluble are homogenized with water in a colloid mill to an emulsion of the consistency of thick cream and then introduced into the slurry mix and agitation continued for thorough mixing and uniform distribution. The slurry is then dewatered in a centrifugal wringer down to 30% and the material is bagged and dried down to a moisture content of 6 to 10%. Since the mosture varies throughout the drying container, blends of sizable quantity are made to insure delivery of uniform moisture content material to the next operation. In this blending operation a small quantity of water soluble ingredient is added. The blended paste is weighed in 6½ lb. increments which are delivered to 14″ x 30″ differential rolling mills with heated rolls and, as the water is cooked out, the material colloids. It is delivered from the mill in a sheet about .080″ thick, 14″ wide and 10′ long. Two of these sheets are then combined on an even speed rolling mill with a single sheet of rework material to give a finished sheet weighing about 18 lbs. This sheet is passed through a slitter where it is cut into strips about 4½″ to 6″ wide. These pass to a heated receiving and inspection table and from there to an ingenious carpet rolling machine which prepares tight carpet rolls of the diameter of the press basket.

Without permitting the material to lose temperature it is charged into mammoth extrusion presses, oil-draulic driven with heated baskets and water-jacketed dies and extruded into the desired shape for final use under a pressure of about 8,000 p.s.i. on the powder. The presses are located in bombproof rooms with 36 inch reinforced concrete walls and are operated by remote control. No operators are permitted in the press room during operation. A normal charge will consist of 120 pounds of powder at a temperature of 115° F. The basket is maintained at 150° F. with die temperature held at 120° F. The extrusion cycle will last perhaps 15 minutes.

It is an interesting fact that the cross section of the extruded strand will be larger than the die and the problem of correct die design has been critical since the dimensional tolerances on the product are of the order of a few thousandths of an inch. At the completion of an extrusion the ram is withdrawn from the press and the operators recharge the press and cut the extruded strand into lengths that are slightly oversize for the final grain dimension. Since internal fissure in the finished product is detrimental, each piece is then examined by x-ray or by a recently developed supersonic device and all fissured grains are returned for rework. Acceptable grains are annealed to relieve internal stress and to stabilize dimensions after which they are cut to exact weight or to exact length, submitted to

various milling, machining and gauging operations and finally packed in a moisture-tight container for shipment. This latter requirement comes from a necessity to use this almost non-hygroscopic material at a moisture level well below its equilibrium point. For the same reasons almost all operations are conducted in air conditioned rooms.

THE DESIGN JOB

The problem of designing a plant to produce this material would have presented many interesting complications even had there been a background of several years of pilot plant study, but war permits no such leisurely study period and decisions had to be made based on whatever information and background could be quickly unearthed in similar fields or adapted from related past experiences. When, on top of all this, the fact that the product is an explosive of very high potential though fortunately of low rate only adds to the magnitude of the job. It is not feasible to describe in detail all of the many problems that arose and the multitude of possible solutions considered, but no doubt it will be of interest to outline some of the new problems that had to be decided without delay:

1. Which type of blender could be used to blend the nitrocotton to insure uniform known charge weights? How large a unit would be economically feasible? Fortunately the explosive risk here is not great but the plant was designed during a period when fear of sabotage was seriously considered and even water-wet nitrocotton can be detonated.
2. What shape and capacity to use in the slurry mixer? What precautions are necessary if free nitroglycerin is present? What type of stirrer should be used? Where should it be located? How could it be driven safely? What type of pump would be safe to handle such a slurry?
3. What type of dewatering equipment to use—filter press, centrifuge, or paper machine? When a centrifuge was chosen, more questions arose. What metals to use? How to drive it safely? How fast a speed would be permissible? How to discharge it safely?
4. What kind of blender should be used for the dried paste—continuous or batch? How large a quantity could be handled in one batch? What arrangements were needed to handle such a hazardous product and insure uniformity?
5. What size roll to use? What temperatures should be used? How to protect the operations in case of fire? What type of flooring to use in this exposure? How should the cycle be regulated—by time or by temperature of the surface or by work input? What material to use for the roll surface? How could protection be provided with the inevitable fires? (An interesting answer to this important problem was discussed in an article in the April 1945 issue of Reader's Digest called "Hell's a-Poppin' in Kansas.")
6. Next came all of the intricate problems of press design with remote and automatic controls of speed and pressure. How thick to build the bombproofs? How far should the building be separated from other operations? How to cut the grains after extrusion?
7. How to detect fissures in the grains? If x-ray, how to design a flow pattern through the house that would safely handle the quantity and yet provide positive identification later to eliminate the defectives? How to protect the workmen continuously working around high power x-ray?

Official U. S. Navy photo

Rockets rigged on the folded wings of F4U Corsair fighter planes aboard a U. S. Navy carrier.

Official U. S. Navy photo

Rockets and bombs stacked on the deck of a Navy carrier ready to be loaded on planes.

CONCLUSION

The successful solution to these and to hundreds of more design problems has proved very satisfactory considering the haste required in making decisions. No doubt these will be modified, improved, and refined, but the basic decisions were more nearly correct than could be normally expected.

When additional lines were needed at the original site, and later at other locations, it has been possible each time to incorporate the improvements that have developed in previous operations. In no case have the basic decisions originally taken been changed in any major particular.

SALES CONTROL

Can Help Salesmen Sell More Chemicals

by R. L. CAIN, Assistant to the Director of Sales

Pennsylvania Salt Manufacturing Company

Philadelphia, Pennsylvania

WHETHER YOU ARE SELLING heavy chemicals or specialties, a good sales control system can keep your salesmen happier and boost returns per man. It need not be expensive, and if properly run should be more than self liquidating. Discussing here the "what" and "why" of chemical sales control, Mr. Cain next month will describe in detail a sales control system for a medium size chemical company.

IN COMPARISON with the highly developed organization of many other lines of human endeavor, the organization of *Chemical Selling* is incomplete in many instances. It is indeed difficult to understand why this should be so in an important field which employs many thousands of men in the U. S. alone.

The backbone of any sales department is the field representative—the traveling salesman. In recent years, he has been referred to by the more high-toned title of sales engineer but, no matter what you call him, he is the man who has to go out and pound the pavements, beat the bushes, and get the business. To produce at or even near peak efficiency, he must be kept happy and contented; he must receive constant attention and care. Under the existing derangement in many sales departments, the salesman is often unhappy and, therefore, is operating below normal efficiency.

SALESMEN'S COMPLAINTS

The failure of a salesman through a slow lowering of his morale is like the death of a man from cancer. In both instances so much damage has been done before perceptible symptoms appear that it may be too late to effect a cure.

Let us take a look at some of the more common business reasons for a bad state of mind in a traveling salesman:

1. Knowledge that his sales call reports are not being studied and used to best advantage at the home office.

2. Failure of the home office staff to send out samples, literature, and price confirmations to customers and prospects as he has requested.

3. Failure of the home office to act promptly on other matters which he has referred to them.

4. Failure to keep him daily advised of orders and other important mail received direct at the home office from customers in his territory.

5. Direct contact between his home office and his customers or prospects (letter, telegram, phone, or personal visit) without his being fully informed and preferably in advance.

6. Failure to be kept informed up to the minute about price changes and stock positions of all products.

7. Obvious failure on the part of his sales manager to keep informed about the salesman's activities.

8. Worry over whether his boss and his company are pleased or displeased over his efforts.

9. Failure to be informed about company news of general interest.

10. Slow and irregular receipt of expense checks—no salesman is ever happy without money in his pockets.

11. Slow and irregular receipt of mail or misdirected mail.

12. Indifferent treatment by his home office, regardless of by what individual—telephone operator, clerk, or president.

13. Failure to be notified of changes of personnel or procedure in home office which affect him but about which he learns only by accident.

14. Fear that his absence from home office may result in his being passed by when home office promotions or expansions are considered.

15. Fear that he has ceased to be "one of the family."

16. Failure of management to detect misfits. Here quite often a simple change corrects everything. It may require just a switch in territories from a geographical point of view, or perhaps a heavy chemical man should be a specialty man or vice versa.

17. Frequent failures of management to support actions taken or statements made by the salesman with customers in his territory.

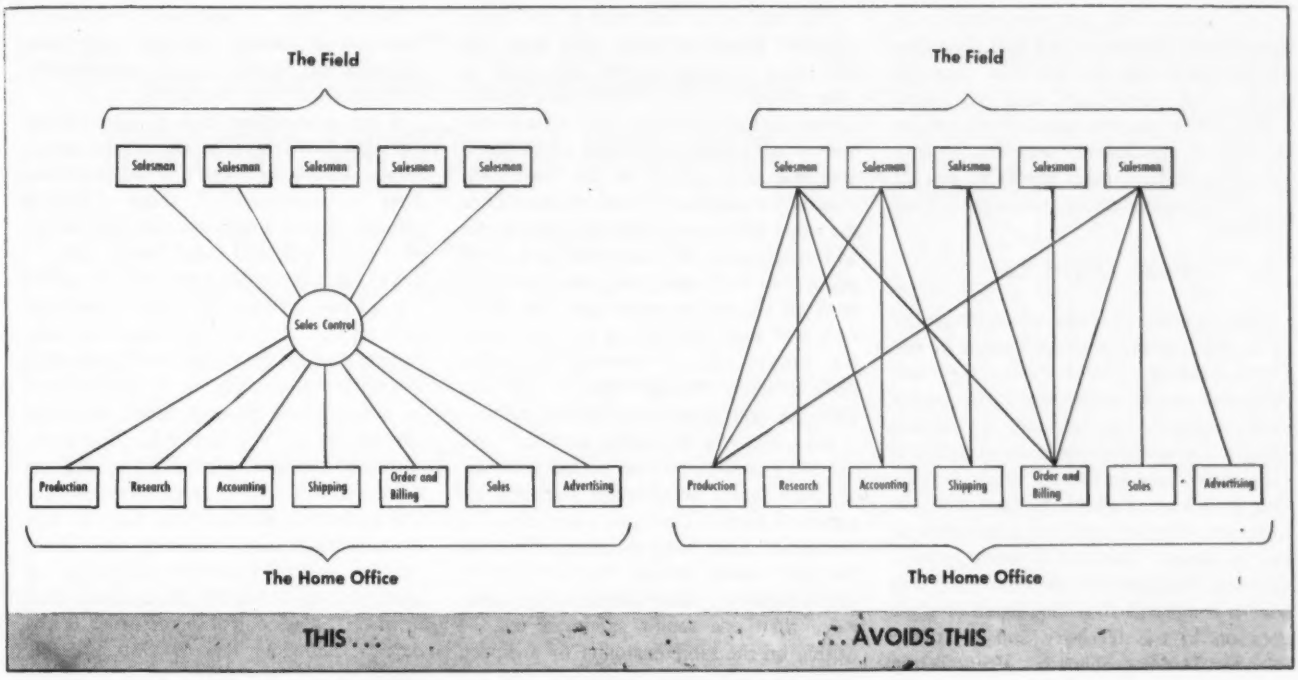
We all know, many of us first hand, how important it is that the men in our armed services receive mail from home regularly. Why? Because in their absence they wonder much about what goes on. The longer they are away, the more they wonder. Little things get big and big things get little in their thoughts—thoughts which are readily distorted in the absence of news from home. So it is with traveling salesmen. The more they are away from the home office—and all successful salesmen should be away most of the time—the more fully they should be kept informed about what goes on back there.

COORDINATION ESSENTIAL

Few of us would ever think of deliberately failing to read and answer a customer's letter, yet how often do we neglect to execute all the moves required by a salesman's report if we are to serve him well. In our home office we would think it rude indeed if even our slightest question asked of the man at the next desk were to be ignored. In fairness, we must think always of the salesman as occupying the desk next to ours, and his every request should be considered as attentively as though it came to us from our nearest neighbor.

It is from this lack of co-ordination between home office and field staff that disorganization in chemical selling frequently originates. But it is something for which no justification exists. The *sales engineer* is just as important and contributes just as much to the economic welfare of our business world as the chemical engineer or the electrical engineer or any other kind of engineer, and yet the fields which these other men represent are much better methodized in many ways.

Selling is different from the other engineering classifications in this respect: Let us consider the case of the electrical engineer. In college he is shown the exact formula for determining the electrical re-



sistance of magnesium. He learns to use that formula, and in the course of his work he may use it many times, always with exact results. But in the case of the sales engineer there is no known formula which his college professor or his sales manager can teach him so that he will be able to measure accurately the sales resistance of a purchasing agent. But we must not let this fundamental difference falsely lead us to believe that it is useless to try to educate, train, and thus produce a sales engineer who can and will operate efficiently under a systematized sales department. It can be done; it has been done in a number of companies.

Any salesman is an expensive article. If we are willing to spend money to pay salesmen their salaries, then we should be willing—if we are good business men—to support those salesmen with a modern *sales control system* operated by a competent and adequate office staff. It requires an immense organization in the U. S. Army to maintain the soldier with a rifle at the front. It has been estimated that of a total of roughly 8,000,000 men in the Army, probably not more than 1,500,000 were in combat divisions at the front. Thus, for every man in the field, at least four men are required in supporting roles. It has to be this way wherever a hard-hitting, fast-thinking, fighting force exists, and surely every business organization at least has dreams of a sales department of that sort.

Yet, in actual practice how often we note the contrary to be true in the business world. A valuable and high priced salesman will suffer a serious loss because his supporting home office staff is so utterly inadequate. What would the public think of a baseball manager who put in his ace pitcher in a world series game and then assigned a rooky catcher as the second half of the battery? What's the sense of having a star ball carrier in the backfield of our football team if we can't support him with some good blocking backs and a sturdy line? So it is in selling. What's the sense of sending out a salesman—a man whom the company has spent much time and effort in training and developing—a man who himself has given perhaps several years to his own seasoning in the field of salesmanship—only to have the whole endeavor fail or be only partially successful because we do not give him due support at the home office. Since this professional man is dealing principally with the human element, we cannot hand him a book of formulas to solve his problems, as we do the electrical engineer, but we can hand him and his entire sales department a book which is just as valuable—a book which gives detailed instructions and information about the brand new *sales control system* which his company has set up.

It is indeed time that sales managers awake to the naked fact that *organized* selling will certainly be a *must* in the postwar era, and those sales executives who elect to shut their eyes to this definite trend will most certainly find themselves in a distressing position a few years hence. Such an attitude toward the obvious is not only unwise, but it is indeed unfair to the men, to the products in question, and to the company itself.

No company can hope to build up good will with its customers and prospects if it has failed to gain the good will of its own sales staff.

WHAT IS SALES CONTROL?

Sales control is a plan regulating all sales activities. It is a plan for coordinating those activities. It is a plan for committing the various sales activities to their true positions of relative importance within the over-all scheme. It is a plan for collecting and consolidating all relevant sales data and then abstracting that data onto permanent written records so that the sales manager may obtain a comprehensive picture of any phase of his domain by simply opening his interphone set and calling his "sales control tower."

Any attempt to introduce a sales control system almost always meets with initial strong opposition from both management and the field staff.

One of the more common excuses advanced by sales managers as to why they have not inaugurated a sales control system is that "you can't teach an old dog new tricks." Every sales organization is made up in the great majority by men who have been with the company for years. These men, as individuals, know their respective customers and trritories well (although even so, in many cases, the men know much less about the territory than they honestly think they do) and most of them have drifted into the habit of carrying this intimate knowledge around locked up inside their heads. They hate detailed sales reports and they honestly can't see any sense to having to write many of them. The salesman invariably objects to any plan which shows the slightest signs of regimenting him or in any way causing him to do extra paper work. With these things in mind, many sales managers are apt to conclude falsely that no newly introduced sales control device will work.

This is a weak excuse. With proper instructions from the sales manager, the salesman can be induced to carry out his part in the control system for a trial period. Actual experience has shown that any reluctance on the part of the salesman

to co-operate with the new strategy is short lived. The mere fact that the salesman realizes that for the first time his work is fully noted and duly recognized makes him a happier man. Even the old time, well established salesman is surprised to see how much benefit he himself gets from a complete written record of his activities.

WHAT CAN IT DO?

Sales control provides a working plan to be used in the accomplishment of organized selling. Sales control will improve salesmen's morale and consequently their efficiency by directly correcting many of the seventeen common complaints previously listed in this article. In addition, it will bring about the favorable adjustment of other common grievances of the salesmen. Under a control system, the sales manager for the first time will have a comprehensive knowledge of what goes on in the territory and what the salesman is doing about it. Being better informed, the sales manager will, then, give his field staff more adequate attention. Sales control will provide the basis for an organized deployment of the field staff under full and continual regulation like the operation of trains on a busy railroad by the block system. By analogy, the salesmen are dispatched with a good order to things so that collisions are avoided and time schedules are maintained. Sales control will regulate complex movements, like traffic lights at a busy city street intersection. Through a sales control system, each operation is recorded in writing and properly catalogued so that salesmen and territories are much more readily interchanged, when necessary, and in each case the new man starting out enjoys the great advantage of a full written record of affairs.

HOW MUCH DOES IT COST?

The cost of a sales control system is comparatively small. A clerical staff of from five to fifteen persons is required depending upon the size of the sales department. An executive administrator must head the unit, although this employee might well be already on hand and operating in the capacity of an assistant sales manager or an assistant to the vice-president in charge of sales. Suitable office space must be provided and the unit must have a reasonable budget to cover normal operating expenses. On the other hand, sales control raises the efficiency of the field staff and this, in turn, will increase the volume of sales. Operated correctly, a sales control system will be a self-liquidating project expense-wise.

NOW IS THE TIME

There was never a better or more opportune time to inaugurate a sales control system than right *now*.

It is safe to say that most of the larger chemical houses of today will enter the full-swing postwar period with few of their prewar salesmen in the same prewar territories calling on the same prewar customers and prospects. Many of the salesmen will undoubtedly be the same individuals but assigned to new territories; or the same salesmen in the same territories will find many old customers and prospects gone and many new ones born; or with all the above status quo, the salesman will find that during the war years his company's line of chemicals has undergone so many changes that he will face different and more complicated tasks.

Also, many of the senior field men will enter the postwar selling period with one or more junior or assistant salesmen assigned to them. Then too, many chemical companies' lines have so increased during the intervening period that it may be found necessary to arrange a set-up where more than one senior salesman will be calling on the same customer or prospect. Here especially is it important that the one's activity be fully and carefully coordinated with that of the other.

During this commercial renaissance hundreds of former salesmen will most certainly fall by the wayside while many new salesmen will come forth.

What an excellent time to start out on the right foot by systematizing sales activities and bringing about a broad and complete co-ordination of those activities through the establishment once and for all of a good, practical sales control plan.

Yes, Mr. Sales Manager, this is indeed a good time to look over your sales control setup. If you then have any suspicions that the system is antiquated, or if you find that perhaps it is non-existent, be assured that prompt action to make corrections will pay dividends. The barnstorming methods of chemical selling are outdated, and sound, practical sales control systems will play vital roles in this great postwar field. Sending sales forces out into the field without providing for adequate supporting organizations is most unwise. Sales control is the order of the day. Organizing it is a comparatively simple matter; yet, its true value measured in terms of increased dollar sales is tremendous.

New Process Makes Salvaged Aluminum Equal to That From Bauxite

SCRAP aluminum can now be converted into new aluminum by means of a process involving digestion with caustic soda. The process was developed by research engineers of the Aluminum Ore Co. working in conjunction with the Air Technical Service Command and the Redistribution and Salvage Office of the Army Air Forces. It is expected to greatly facilitate the salvage of aluminum from wrecked, war weary and obsolete airplanes.

In the past, to salvage the aluminum in such planes, it has been necessary to sort out the other materials and melt down the aluminum. The metal thus obtained was of limited value because it was a mixture of aluminum alloys, more or less contaminated by other metals that could not be removed by commercial sorting methods.

The aluminum obtained from the newly developed process is for all intents and purposes the same as aluminum manufactured from bauxite. It can be used anywhere that any other commercially pure aluminum can be used.

The process centers around a novel way the Aluminum Ore Co. has developed for returning the scrap aluminum to the Bayer process, used in making alumina from bauxite. The planes or other scrap are introduced into a bath of caustic soda solution which dissolves away the aluminum, while any steel nuts and bolts, copper piping, bronze bushings, rubber, or other non-aluminum parts are not attacked by the caustic and remain in solid form. In the case of aluminum alloys, the alloying elements likewise are not attacked by the caustic but remain in the sludge. The scrapped plane is thus taken apart chemically instead of by tedious hand labor.

The solids are removed from the solution in filter presses, and the liquor passing through the filters is returned to the Bayer process to be manufactured into pure aluminum oxide. This is done by pumping the liquor into precipitating tanks and allowing it to stand and cool. the process. The aluminum hydroxide begin to settle out. These crystals are removed and washed to free them of caustic soda which is again returned to the process. The aluminum hydoxide crystals are then heated white hot in large rotating kilns to drive off the chemically combined water and leave commercially pure aluminum oxide, or alumina. This is then electrolytically reduced to metallic aluminum in the usual way.

The process is particularly interesting at this time, according to Brigadier General F. M. Hopkins, Jr., Redistribution and Salvage Officer of the Army Air Forces, in that it may permit disposal of old planes in a way that will not make them a drug on the market. One of the worst tragedies that could befall the Army Air Forces after the war would be to have a large number of technically obsolete planes on hand and be compelled to fly such planes merely because they are available, he said.

A Guide to Harmonious Collaboration Between TECHNICAL SERVICE and RESEARCH

by NORMAN A. SHEPARD,* Chemical Director
American Cyanamid Company, New York, N. Y.

TECHNICAL SERVICE AND RESEARCH are both necessary functions of a chemical company. Friction between them is not only unwarranted and unreasonable, but can be reduced if not avoided altogether, by observance of the following precepts.

IN ANY human relationship there is no substitute for a broad cooperative, unselfish, personal attitude on the part of those who must work closely together and if the various departments of a chemical company are to work effectively together, this attitude must permeate not only the laboratory directors, but also the staffs themselves.

The set-up of technical service in the company organization is of vital importance to its smooth functioning. But, unfortunately, the technical service head usually does not control the set-up. In the writer's opinion, the executive in charge of research and development should be in charge of technical service as well as of research. It seems essential that both of these departments should be under the same executive, and in no case in the writer's experience is the vice-president in charge of sales a suitable executive to be over both departments—least of all the research department. If technical service is under the sales executive, and the research under the research executive, there is bound to be trouble unless there is a most unusual and close understanding between these two executives.

Profession jealousy is not confined to the research director and the technical service director; two equally ranking executives can be just as temperamental and "ornery" and uncooperative. Hence it is usually a dangerous error in organizations to have these directors reporting to two different executives.

The geographical location of the two departments is important. It is a truism that there is no substitute for frequent personal contact when there are possibilities of misunderstanding between individuals. Hence, it is best to have the technical service and evaluation department and the research department under the same roof, or in neighboring buildings. Frequent meetings are thus possible and the necessity for discussion by telephone or by correspondence is largely eliminated. Furthermore, when differences arise, they may be settled immediately. Also, geographical proximity is of great importance in promoting close and understanding relationships between the staff members of the two departments.

WHY FIGHT?

There is no fundamental reason for difficult relationships between the research and the evaluation and development departments. Their interests are one and inextricably intertwined: no new research developments, no new products; no efficient evaluation of research development; no fruition for that research. Yet differences—serious and progress-blocking—do arise. Why?

Technical service men will often, and sometimes with the condonement of the director, do competitive research "on the QT" to outshine, if possible, the results obtained by the research department. The writer, for one, believes strongly in keeping research in the research department and evaluation in the technical service department. He does not, however, favor any fast ruling on the matter. There are cases where for reasons of personnel, special equipment, expedition, etc., a research can be and should be conducted in technical service, but not *sub rosa*. It should be done only with the full knowledge of the directors involved, and with the full cooperation of the staff members whose interests are concerned.

Patents may become a source of resentment between research and technical service men. Research develops a new material, or a new or more practical synthesis of an old material; the patents on the process go to the research man. The technical service investigator finds an important use for the material; he gets the use patent. It is the use patent that arouses the interest of the sales department and eventually results in sales and profits. The technical service man is likely to get more credit for the development than he deserves. The directors should see that the credit is properly shared.

Also, in many cases, the research man plays an important part in the use development. Such a contribution should be recognized, and where the contribution is sufficiently clean-cut, the use patent should be a joint one.

Technical service men, whether directly responsible to the sales executive or to the research and development head, have greater opportunity to contact the field and the trade than research men. They have a better chance to see the practical application and results of their efforts. It is beneficial to give research men occasional opportunities to go into the field and not confine their travelling exclusively to scientific meetings.

Domination of technical service by the sales department is bad both for technical service and for research. If the situation is not carefully guarded, technical service becomes solely a fire department to put out the fire of customer complaints and to do customer development work; and research waits in vain for the evaluation of its products and effort.

COOPERATE

Technical service must give research prompt evaluation and conversely research must promptly remedy deficiencies in the scope of their investigations which hamstring the development of new uses. The surest way to stimulate research in the technical service department is for the research department to lose interest in following through a development. Too often a research worker, once his original idea is born, loses interest in his offspring and is too absorbed in conquering new worlds to come down to earth and clean up the loose ends he has left. This makes for an animosity between the workers and between the departments which is attributed to lack of cooperation. It is often not actually that; it is a peculiarity of many brilliant research men. Technical service men had best understand that and either fill in the missing link themselves, or wheedle the researcher into doing the necessary clean-up work.

The technical service man is inclined to get an exalted opinion of his importance and to become dictatorial to his research associate. A technical service director can improve relations with research by fostering fraternizing of his men with the research men, and encouraging exchange of information. And, contrariwise, he can damage the relations by encouraging secrecy.

There are a few additional random suggestions to observe:

Train your men to be careful about demanding action from the research department—the aggressive technical service man is prone to transgress in this direction.

Avoid misunderstanding by confirming

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suggestions and discussions in writing. This may avoid a patent row over who is the inventor.

When a misunderstanding between individuals in the two departments comes up, encourage your men to fight it out on the lower level. The directors should rarely get themselves precipitated into the situation and certainly only as a last resort.

Teach your men that when they butt into a research man's function they usually end up by neglecting their own work. In other words, such meddling is dangerous in that the man's legitimate job suffers.

See to it that in all transactions between the departments, every one concerned is consulted. See that the research man who should be included in an informal meeting is there; that all who should have copies of letters get them; that the research men meet important visitors when their interests coincide.

Welcome transfer of staff members from technical service to research, and vice versa, when the men desire it and are fitted by training and experience to carry on the new work. These men prove to be important links in bonding the two departments together.

First Reports on German Synthetic Fuel And Rubber Industries

SYNTHETIC FUELS

German processes less efficient and product inferior to American. Data obtained on gas synthesis.

THE Petroleum Administration for War has now officially announced that a group of U. S. technical experts is in Germany under its auspices studying refinery and oil production methods. This is the first official announcement on any of the several U. S. technical investigating committees that are known to have been sent into Germany behind the advancing armies well before V-E Day.

Composed of leading technologists from oil companies throughout the American petroleum industry and from Government, the petroleum group was assembled in England and followed advance elements of the American armies in order to reach the German oil centers before records could be removed or destroyed and personnel dispersed.

The investigation covered German manufacturing methods of hydrogenation, catalytic cracking, hydroforming, alkylation, polymerization and other processes.

While few specific conclusions can be drawn this early in the investigation, it is possible to state in general that the German methods of refining crude oil and manufacturing high-quality products were far less efficient than those in common use in the United States. Moreover, the quality of the petroleum products used by the German armed forces, especially gasoline, was inferior to that supplied the armed forces of the United Nations, the survey showed, not because of lack of scientific knowledge but because of inability to construct and maintain production capacity.

The difference was especially noticeable in the field of aviation gasoline. The Nazis produced the ingredients for 100-octane gasoline, but not in sufficient quantity to bring all the gasoline they needed to that standard.

Following the vanguard of American forces across France, the investigating group learned little of value, since the Germans had not augmented French plants, and the Nazi staffs had retreated with the Wehrmacht, taking their records with them. In Germany, however, despite the badly damaged condition of the plants, most of which had been bombed out of production completely for several years before American forces reached them, information of considerable value was obtained, the survey group believes.

At Wesseling, site of a large hydrogenation plant, a German engineer finally admitted under questioning that he had compiled a complete story of the plant and buried the manuscript. This illustrated record of some 250 pages gave the investigators their best picture of this type of operation, disclosing one German dehydrogenation process for use in making aviation gasoline. The Americans learned that the Nazi hydrogenation plants were operated at extremely high pressures (several hundred atmospheres) and that the discovery of new catalysts had permitted them to revise the process and convert the middle oil fractions to high octane gasoline in a single step. By adding lead, the octane number was raised to from 90 to 95—high enough for the fuel-injection type of aircraft engine used by the Germans.

Near Reelkirchen, an alert artillery officer noticed a German boy playing with blueprints. Suspecting their importance, he learned that these and other documents had been hidden in a farmhouse. An intensive search of this area yielded many boxes of records, which were moved into an old castle where they filled several rooms. Here, the oil mission investigators, examining the massive stacks of papers, found the answers to their final questions set forth in detail—the results through January 1945 of German research upon the gas synthesis method of producing liquid fuels and lubricants from coal. They already had quizzed workers and examined the debris of gas synthesis plants built around 1938, but these records brought the German history of this process of synthetic fuel and lubricant manufacture up to date. They described several wartime refinements, including the use of iron catalysts and recirculating processes, as well as detailed data on the manufacture of by-products.

Tons of records have been recovered from the ruined plants and microfilmed for removal to this country for translation and study. At one plant, after the records and laboratory experimental data had been seized it was learned that a summary had been made and buried to preserve the information for the future. This hiding place was finally discovered, and the summary, which neatly tabulated the results of the voluminous records, also was taken for study.

In most cases, German technicians cooperated with the investigating group and supplied much additional information. Their attitude in many cases was one of scientific detachment, and some seemed glad of an opportunity to talk about their industrial problems with technologists from the world from which they had been cut off for so many years. Members of the American group maintained a strictly formal attitude in their questioning, not introducing themselves or giving their names, but succeeded in supplementing materially the information found in the laboratories.

Several underground refineries had been substantially completed and were about ready to start operation when the war ended, the group's investigation has revealed. Their construction and location were discovered in captured enemy documents months before, but various uncertainties made it difficult for the allies to determine the productive capacity of these refineries. Built in caves, abandoned mines, and other natural and man-made shelters, they were difficult targets from the air and the only alternative was to

destroy the railroads upon which they were dependent for raw materials.

Commenting on the condition of the German plants, one of the members of the group said that "all of the surface synthetic fuel plants, primary targets of the RAF and American Air Forces, were bombed out—shattered to bits by repeated raids. Their production, estimated at about 4,000,000 tons of oil a year at the peak, was reduced to below five per cent of that amount despite the efforts of repair crews numbering as many as 20,000 men for a single plant. Plant production curves, turning sharply downward in 1943, rose only when bad weather grounded the Allied bombers.

"When reconnaissance photographs taken at intervals after a raid disclosed under minute scrutiny that repair workers were being taken off the job, air force officers were alerted and another strike was planned. The first jets of steam betraying that the plant was back in operation were the signal for attack, and the bombers swarmed back over the target undoing within a few minutes months of repair work."

In Europe before the fighting ended west of the Rhine, members of the group examined the captured Moers-Homburg plant within a half mile of the river bank. Later members of the party examined other plants on the west bank of the Rhine, including those at Wesseling and Ludwigshafen. As rapidly as plants in the Ruhr area were taken, German personnel were interrogated and valuable documents removed. A group of approximately 15 investigators was kept busy by this work for more than six weeks. Several shale oil plants also were examined.

The group, organized under the general direction of C. Stribling Snodgrass, Foreign Refining Director of PAW, was composed of the following technologists with Dr. W. C. Schroeder of the Department of the Interior's Bureau of Mines acting as field leader:

John G. Allen, Phillips Petroleum Co.; Harold V. Atwell, The Texas Co.; E. L. Baldeschweiler, Standard Oil Development Co.; George S. Bays, Humble Oil & Refining Co.; Leonard E. Carlsmith, Standard Oil Co. of Louisiana; Ernest Cotton, Gulf Oil Co.; L. P. Evans, Socony-Vacuum Co.; Warren F. Faragher, Houdry Process Corp.; Vladimar Haensel, University Oil Products Co.; Lester L. Hirst, Bureau of Mines; William A. Horne, Gulf Research and Development Co.; Irvin Harvy Jones, Koppers Co.; Jean P. Jones, Phillips Petroleum Co.; Paul K. Kuhne, Gulf Oil Corp.; Byron L. MacKusick, Pure Oil Co.; Louis L. Newman, Bureau of Mines; William W. Odell, Bureau of Mines; A. R. Powell, Koppers Co.; Hans Schindler, Pure Oil Co.; Guenther Von Elbe, Bureau of Mines, Ernest F. Voss, Humble Oil & Refining Co.; Horace M. Weir, Consulting Engineer; and D. S. Fraser, Chief, Technical Section, Foreign Refining Division, PAW, on temporary assignment as London representative.

SYNTHETIC RUBBER

U. S. ahead of Germany in both products and processes

THE war-born American synthetic rubber industry has developed better rubber than Germany's, a technical mission that went to Europe to study rubber developments there has reported to United States Government officials.

"American synthetic rubber, the methods of manufacturing it and the products made from it are generally superior to those of Germany," John L. Collyer, the War Production Board's special director of rubber programs, and S. T. Crossland, executive vice-president of the Rubber Reserve Co., said in a joint statement.

The technical mission, headed by Russell Hopkinson, director of commercial development of the United States Rubber Co., followed the advancing armies into Germany well before V-E Day. It was found that the Germans were making only two types of synthetic rubber: Buna-S (butadiene-styrene, for tires and general purpose) and Buna-N (butadiene-acrylonitrile, for oil resistance and other special purposes), and that combined production never exceeded 110,000 tons a year. Process operating efficiencies were found to be much lower than those being obtained regularly in U. S. plants. Most of the German butadiene was made by the aldol process from acetylene or ethyl alcohol, and by the Reppe process. Styrene was made from ethyl benzene by a process very similar to that used in this country.

German tires are now being tested further in the United States in direct comparison with American synthetic tires, although it is already known that the German tires are subject to failure at high speeds or under heavy loads due to excessive heat generation.

In their statement, Mr. Collyer and Mr. Crossland said:

"The United States and its allies could not have produced tires, tubes and other rubber products in sufficient volume and of adequate quality to maintain their armed forces and a civilian economy if they had had to rely on the type of synthetic rubber used by the Germans.

"Germany reached a commercial scale of synthetic rubber production many years before this country. The total rated capacity of their industry was 170,000 tons a year, but their actual production never exceeded 110,000 tons a year.

"By contrast, the United States in two years established a synthetic rubber industry with a rated capacity of 850,000 tons a year and it has been demonstrated that it can operate at 130 per cent of that rate. With minor revisions and additions to certain existing plants, the American industry is expected in 1946 to produce 1,200,000 tons—or 140 per cent of its original rated capacity.

"Since liberation, French manufacturers of rubber products have used GR-S, the American general purpose synthetic. Using German synthetic rubber, the French found that fabricating capacity was reduced fifty per cent for end-products, because the rubber has to be heat softened before compounding and is more difficult to work.

"The sole producer of German synthetic rubber was I. G. Farbenindustrie. It has been established that a system of cooperation, such as prevails between the American rubber producers and manufacturers, did not exist in Germany. In this country, the companies that manufacture the end-products have shared in the development of the synthetic industry. Oil, chemical and rubber companies have worked together closely and in conjunction with the armed forces and Government.

"The synthetic rubber program in this country includes the manufacture of neoprene and butyl, which are wholly of American origin; GR-S, which is the principal tire type rubber, and GR-A, which is a special purpose rubber. In Germany the only types manufactured were Buna-S (general purpose tire type) and Buna-N (special purpose type).

"Despite rigorous industrial and military manpower requirements in Germany, the rubber plants were found to be staffed fully with highly trained technical personnel. A complete set of replacement parts for machinery and equipment was held in reserve at a central location for immediate emergency shipment.

"Members of the American rubber mission were fortunate in locating Germany's key technical personnel. By questioning them and by painstaking surveys of their remaining plant facilities, details of processes and techniques were obtained. The information was corroborated by original records, which the Germans had maintained.

"This information in technical detail will be made available to American industry through the Rubber Bureau of the War Production Board and the Rubber Reserve Company. However, there is no indication that German synthetic rubber techniques will be of material help to the American rubber industry, because our present processes are superior in so many respects."

Members of the mission, in addition to Mr. Hopkinson, were: J. D. Fennebresque, Celanese Corp.; B. S. Garvey, B. F. Goodrich Co.; E. T. Handley, Firestone Tire and Rubber Co.; R. D. Juve, Goodyear Tire and Rubber Co.; J. W. Livingston, Rubber Reserve Company; Dr. Carl C. Monrad, Carnegie Institute of Technology; A. H. Nellen, Lee Tire and Rubber Co.; R. D. Schatzel, General Cable Co.; J. E. Troyan, Phillips Petroleum Co., and W. L. White, Raybestos-Manhattan Co.

How to Prepare Warning Labels for Hazardous Ch

THE FIRST STEP IN ASSURING safe handling of dangerous chemicals is proper labeling of the package. Particularly is this true in times like the present when so many more new and unskilled persons are engaged in the shipping and use of chemicals. Recognizing the need for development of better standards and guides for proper labeling, the Manufacturing Chemists' Association about a year ago set up its Label and Precautionary Information Committee. The first report of this committee has recently been published by the MCA as Manual L-1, "A Guide for the Preparation of Warning Labels for Hazardous Chemicals," and is reprinted here by permission. It includes such important information as general principles of precautionary labels, classification of hazards, and recommended label cautions.

THE development of new chemical products and the introduction of chemical processes into ever-widening fields has accentuated the need for furnishing appropriate information in those cases where special precautions are necessary. Many chemicals present no hazards in normal handling and storage and for these products no precautionary labels are necessary.

The education of employees regarding chemical hazards is, and must remain, the direct responsibility of their employers. However, such hazards are not confined to employees alone, and information concerning them should, so far as practicable, reach every person using, transporting, or storing chemicals. The most practical means for the seller to disseminate this information appears to be by labels affixed to containers of hazardous chemicals, bearing appropriate precautionary statements and instructions stated as simply and briefly as circumstances permit.

In the interest of uniformity and more adequate labeling of chemical products, the Manufacturing Chemists' Association has prepared its Manual L-1, "A Guide for the Preparation of Warning Labels for Hazardous Chemicals," from which the following information is taken. In addition to its general recommendations, the MCA has prepared suggested labels for specific products. These have been printed as Manual L-2.

Individual statutes, regulations or ordinances may require that particular information be included on a label or that a specific label be affixed to a container as in the case of ICC Regulations. In each case, the requirements of these laws should also be studied. *The warning labels suggested here should be used in addition to, or in combination with, any label required by law.*

GENERAL PRINCIPLES

In the preparation of any precautionary label the following principles should first be considered:

1) Each chemical product (including mixtures) presents a distinct problem and must be treated individually, in the light of its own characteristics.
2) Extreme care should be exercised in the choice of terminology. Statements should be brief and simple.
3) On labels for different products, uniformity in language to indicate the same hazards is most desirable in order to gain greater understanding through standardization.
4) Precautionary statements must be accurate and selectively chosen. To be effective, they should be used only when necessary — indiscriminate use will tend to destroy their value. For example, the use of the word "Poison" on labels should be restricted to cases in which (1) it is prescribed by law, or (2) it is associated through common usage with a particular compound, or (3) it is indicated because of special circumstances in a product's distribution to, or utilization by, the public. The commonly accepted meaning of "Poison" refers to single dose oral toxicity. It covers inadequately, in a quantitative sense, the hazards from acute and chronic exposure, ingestion, skin absorption and inhalation. Therefore, in most cases the use of a signal word such as "DANGER," "WARNING" or "CAUTION" with a statement of the hazard present is much more informative.
5) Chemical names should be those recommended by the American Chemical Society.
6) The use of a non-descriptive code designation or trade name as the only identification of a hazardous chemical should be avoided. If for any reason, it is undesirable to show the chemical name, or if the chemical name is so complex as to be meaningless except to the trained chemist, the label should state the type of chemical, e.g., "corrosive acid," "lead compound."
7) The following subject matter should be considered for inclusion on a precautionary label:
   1. Chemical name.
   2. "Signal word" (DANGER — WARNING—CAUTION) designating degree of hazard (Column A Schedule 3).
   3. Affirmative statement of "hazard" (Column B Schedule 3).
   4. "Precautionary measures" covering actions to be followed or avoided (Column C Schedule 3).
   5. Instructions in case of accident, where advisable (Column D Schedule 3).

PREPARATION OF LABELS

The basic considerations in the preparation of a precautionary label are:

1. Determination of the hazards present in the particular chemical.
2. Selection of appropriate statements for each hazard.
3. Arrangement of statements in the order of emphasis desired.

The most frequently encountered hazards have been classified by the MCA into 10 types as listed in Table I. Set opposite each class are statements illustrating characteristic precautions usually required for that type of hazard.

Many chemicals will have more than one type of hazard, in which case the statements for each type should, if appropriate, be included on the label.

As each chemical must be treated individually, there will be many instances in which the illustrative statements will not be applicable either because they do not accurately express the degree of hazard or because they fail to cover the particular characteristics. In such cases, suitable statements should be selected from Table II. This table presents a more comprehensive list of statements arranged in columnar form, and grouped as follows:

(A) Signal Word, (B) Hazards, (C) Precautionary Measures, and (D) Instructions in Case of Accident.

Chemicals

Column A—The degree of hazard can be expressed only in relative terms. The purpose is two-fold: to indicate to the reader the comparative seriousness of the danger involved in handling a given product and to call attention to the precautionary instructions which should immediately follow. The "signal words" recommended are, in the order of diminishing severity of hazard (1 DANGER; (2) WARNING; (3) CAUTION.

Example: WARNING!

Column B—From this column should be selected the phrase (or phrases) that most accurately describes the principal hazard. This is placed on the same line as the "signal word."

Example: WARNING! FLAMMABLE.

Column C—The appropriate statement of "precautionary measures" should be chosen from Column C and should follow on subsequent lines.

Example: WARNING! FLAMMABLE.
Keep away from heat and open flame.
Use with adequate ventilation.
Avoid prolonged breathing of vapor.
Avoid prolonged or repeated contact with skin.

Column D—When it is advisable to include instructions in case of accident, the appropriate statement may be selected from this column. If the statements from Schedule 3 fail to meet the exact needs, they should be modified to suit. In the example chosen, toluene, no phrase from this column appears to be necessary.

While every compound carries some hazard, if improperly used, it is impractical to cover every possible contingency on a label. Efforts should be directed toward naming the serious hazards, and warning against such abuses and accidents as are likely to be encountered under normal conditions. There are scarcely any means of measuring in absolute terms the relative seriousness of hazards, and the recommendations in Table II only contemplate their division into two or three degrees of intensity. It follows that of two compounds one may be less hazardous than the other and yet may carry the same warnings and cautions.

DEFINITIONS

Flammable Liquid[1]—An inflammable liquid is any liquid which gives off inflammable vapors (as determined by flash point from Tagliabue's open-cup tester, as used for test of burning oils) at or below a temperature of 80° F.

Corrosive[2]—(Physiological) — A corrosive is an agent which in contact with living tissue will cause more or less severe destruction of tissue by chemical action.

Irritant[2]—(Physiological)—An irritant is an agent which in contact with living tissue will induce either immediately or after prolonged or repeated contact a more or less severe local tissue reaction not leading directly to destruction of tissue.

Sensitizer[2]—(Physiological)—A sensitizer is a material which as ordinarly handled does not necessarily cause any discernible reaction in living tissue but which after initial or repeated contact with the tissue of some individuals may, at a later date, produce a prompt inflammatory reaction on contact, even in minute amounts, with the tissue of the same individuals.

Dusts[3]—Solid particles generated by handling, crushing, grinding, rapid impact, detonation and decrepitation of organic or inorganic materials such as rock, ore, metal, coal, wood, grain, etc. Dusts do not tend to flocculate except under electrostatic forces; they do not diffuse in air but settle under the influence of gravity.

Fumes[3]—Solid particles generated by condensation from the gaseous state, generally after volatilization from molten metals, etc., and often accompanied by a chemical reaction such as oxidation. Fumes flocculate and sometimes coalesce.

Mists[3]—Suspended liquid droplets generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing, foaming, and atomizing.

Gases[3]—Normally formless fluids which occupy the space of enclosure and which can be changed to the liquid or solid state only by the combined effect of increased pressure and decreased temperature. Gases diffuse.

Vapors[3]—The gaseous form of substances which are normally in the solid or liquid state and which can be changed to these states either by increasing the pressure or decreasing the temperature alone. Vapors diffuse.

Poison—There is no definition adequate

TABLE I—CLASSIFICATION OF HAZARDS

Class	*Typical Label*
I. Flammable Liquids and Oxidizing Agents which Support Combustion A. Flash point 20° F. or below.	DANGER! Extremely Flammable. Keep away from heat and open flame. Keep container closed.
Flash point above 20° to 80° F. inclusive.	WARNING! Flammable. Keep away from heat and open flame. Keep container closed.
C. Flash point above 80° F.	No cautionary label recommended (as regards flammability) except where required by local regulation.
II. Flammable Solids and Oxidizing Agents as Classified by the ICC.	CAUTION! Exposure May Cause Fire or Create Fire Hazard. Keep away from heat and open flame. Keep container closed. In case of contact: Immediately flush with plenty of water. Remove and wash clothing before re-use.
III. Vapors Immediately Toxic or Extremely Irritating Even on Exposure for a Short Time or to Low Concentration.	DANGER! Extremely Hazardous Vapor. Do not breathe vapor. Do not get on skin. Do not get in eyes. Keep container closed and away from heat. Keep away from feed or food products. Have air line respirator or gas mask approved by U. S. Bureau of Mines for purpose, available for emergency.
IV. Vapors Hazardous from Prolonged or Repeated Exposures, or Exposure to Higher Concentrations.	WARNING! Harmful Vapor. Use only with adequate ventilation. Avoid prolonged breathing of vapor. Keep container closed and away from heat.
V. Vapors Physiologically Inert.	CAUTION! Vapor Reduces Oxygen Available for Breathing. Use with adequate ventilation. Keep container closed.
VI. Harmful Dusts.	CAUTION! Harmful Dust. Avoid repeated breathing or skin contact. Keep away from feed or food products.
VII. Skin Irritants—Corrosive.	DANGER! Causes Severe Burns. Do not get in eyes. Do not get on skin. Do not get on clothing. In case of contact: Immediately flush with plenty of water. Remove and wash clothing for re-use.
VIII. Materials Causing Skin Irritations after Repeated or Continued Contact.	CAUTION! May Cause Skin Irritation. Avoid prolonged or repeated contact.
IX. Materials Toxic through Vapor Inhalations or Skin Absorption.	WARNING! Dangerous if Absorbed Through Skin or Breathed. Avoid contact with skin or clothing. Avoid breathing vapor. In case of exposure: Remove to fresh air. Immediately wash with soap and plenty of water. Remove and wash clothing before re-use.
X. Toxic if Taken Internally. Applies to materials covered by statutory definition of poison liable to be destructive of human adults in doses of 60 grains or less (4 gms.) or to any material toxic in amounts likely to be taken internally through easily anticipated errors.	Label as legally prescribed. If not covered by regulation a typical label might read: DANGER! May be Fatal if Swallowed. Do not take internally.

for all cases. See General Principles 4.

EXPERIMENTAL SAMPLES

The labeling of experimental samples of new products presents unusual problems. All of the properties or possible uses of a product are seldom known. The following safeguards are therefore recommended:

1. Samples of products which are already on the market which have a standard warning label should carry the same warnings as are used on commercial shipments.

2. The following label is suggested for samples of any material that has never been in commercial production unless (1) the material is known to be wholly innocuous, or (2) the dangers are limited to known hazards and appropriate cautions are submitted.

Sample
For Experimental Use Only
(Name or Description of Product)
CAUTION! The chemical, physical and toxicological properties of this product have not been fully investigated and its handling or use may be hazardous. Exercise due care.
Non-warranty clause—optional
The supplier makes no warranty of any kind, express or implied, concerning its use. The user assumes all risk of use or handling, whether or not in accordance with any directions or suggestions of the supplier.

3. The identity of the sample, indicated in parentheses above, should be as clear as possible. Wherever feasible, it should be the name of the compound, and in any case it should be the best possible identification to aid the user in knowing with what he is concerned.

4. Where there are significant known hazards they should be so indicated.

5. The above label may be used in the case of old products being considered for new uses.

TABLE II—RECOMMENDED LABEL CAUTIONS

A. Signal Word a. DANGER! b. WARNING! c. CAUTION!	*B. Hazards*	*C. Precautionary Measures*	*D. Instructions in Case of Accident*
	Flammability		
	a. Extremely Flammable (flash point 20° F. or below). b. Flammable (flash point above 20° to 80° F. inclusive). c. Exposure May Cause Fire or Create Fire Hazard.	a. Keep away from heat (sparks) and open flame.	
	Volatility		
	a. Highly Volatile. b. Volatile (Solvent).	a. Keep out of sun and away from heat.	
	Inhalation		
	a. Extremely Hazardous Vapor. b. May be Fatal if Inhaled. c. Harmful Vapor. d. Vapor Reduces Oxygen Available for Breathing. e. Harmful Dust. f. Causes Irritation to Eyes, Nose and Throat.	a. Do not breathe vapor (or) Avoid breathing vapor. b. Avoid prolonged or repeated breathing of vapor. c. Use (only) with adequate ventilation. d. Avoid prolonged breathing of dust.	a. In case of exposure remove to fresh air. b. Have air-line respirator or gas mask approved by U. S. Bureau of Mines for purpose available for emergency.
	Contact		
	a. Corrosive Liquid. b. Causes (Severe) Burns. c. Dangerous Because (Rapidly) Absorbed Through Skin. d. Causes Skin Irritation. e. May cause Skin Irritation.	a. Do not get (1) in eyes (2) on skin (3) on clothing. b. Avoid contact with (1) eyes (2) skin (3) clothing.	a. In case of contact (1) Immediately flush with plenty of water (for at least 15 minutes). (2) Immediately wash with soap and plenty of water. (3) Remove and wash clothing before re-use.
	Ingestion		
	a. Poison (skull and crossbones). b. May be Fatal if Swallowed.	a. Do not take internally.	
	General		
		a. Keep container closed (and away from heat). b. Keep away from feed or food products. c. Keep dry. d. Store in cool place.	a. Get medical attention. b. In case of spillage, flush with plenty of water. c. In case of spillage, absorb with sand, ashes or earth.

The use of any warning or other statement listed above is not necessarily limited to the hazard under which it is grouped. The grouping merely indicates the type of hazard to which given statements most frequently apply.
The small letters are not intended to indicate a correlation between similarly lettered statements in adjacent columns but are for identification only.
The parenthetical words indicate optional statements.

The following specimen labels illustrate the application to specific products of the principles set forth in this article:

Product Combining Hazards of Class I-B and IV (Schedule 2) Chemicals.

Toluene
WARNING! Flammable.
Keep away from heat and open flame.
Use with adequate ventilation.
Avoid prolonged breathing of vapor.
Avoid prolonged or repeated contact with skin.

Product Requiring Modified Cautions and First Aid.

Aqueous Hydrofluoric Acid
DANGER! Corrosive Liquid. Hazardous Vapor.
Causes severe burns which may not be immediately painful or visible.
Do not breathe vapor. Do not get in eyes. Do not get on skin. Do not get on clothing.
In case of contact or suspicion of contact: Immediately flush skin (until whiteness disappears) and eyes (for at least 15 minutes) with plenty of water, paying particular attention to skin under nails.
Avoid use of greasy ointments.
Get medical attention.
Remove and wash clothing before re-use.

Proprietary Product (e.g., containing fluorine salts).

(Proprietary Name)
Contains Fluorine Compounds.
WARNING! Poisonous if Taken Internally.
Avoid breathing dust.
Flush spillage to sewer with water.

FOOTNOTES

[1] ICC definition. While the term "inflammable" is used by the ICC, the preferred form "flammable" is used in this Manual.
[2] MCA definition.
[3] As defined in Chapter II "Engineering Control of the Air Contamination of the Working Environment" Allen D. Brandt, D.Sc.) page 198, "Manual of Industrial Hygiene," USPHS.

Manual L-1 and companion Manual L-2 are supplied by Manufacturing Chemists' Association of the United States, 608 Woodward Building, Washington 5, D. C., Price 25 cents each.

Rubber Facts

THE following interesting and significant statements about the present rubber situation were made recently by John L. Collyer, special director of rubber programs of the War Production Board and president The B. F. Goodrich Co.:

- Average cost of making synthetic rubber is now 32 cents a lb. But even if it were available at 20 cents a lb. today, tire makers would find it economical to pay 30 cents for natural rubber.
- Of the 630,000 tons of natural rubber on hand in the U. S. at the end of 1941, about 55,000 tons will remain at the end of 1945. All will be used up by the middle of next year.
- The synthetic rubber program that was in existence at the time the Baruch Committee rendered its famous report on rubber was within 5 per cent of the present program. It had been set up by the Reconstruction Finance Corporation and the rubber companies.
- Passenger car tires made of 99 per cent synthetic rubber are at present about 90 per cent as good as natural rubber tires on an all-around performance basis. For synthetic truck tires, performance is only about 60 per cent of natural rubber.

Various Chemical Mixtures Used in CWS Fire Bombs

THERMITE, MAGNESIUM, ASPHALT, oil, gasoline and barium nitrate are some of the chemicals that make the Army's fire bombs unquenchable.

FOUR types of incendiary bombs produced by the Chemical Warfare Service are now in use against the enemy. Three were wholly developed by American scientists since Pearl Harbor while the fourth, the magnesium bomb, is a copy of European types.

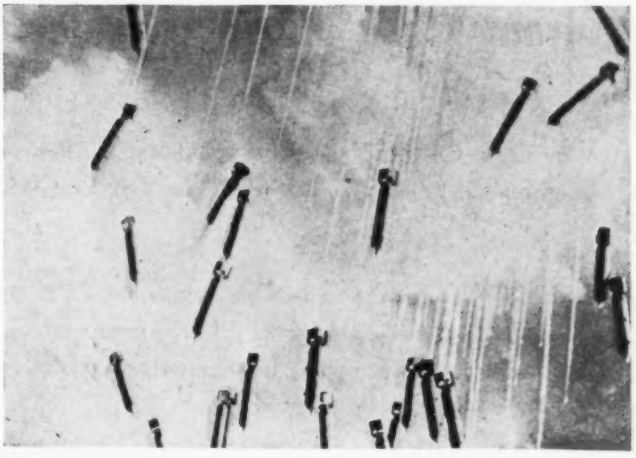
The fire bombs which are produced at CWS arsenals and by hundreds of private plants under contract to the six Chemical Warfare Procurement Districts, can be aimed with precision. The small missiles are packed in aimable clusters which fall like a single bomb from the plane and break open a few thousand feet above the target, releasing individual bombs in a tight bomb pattern.

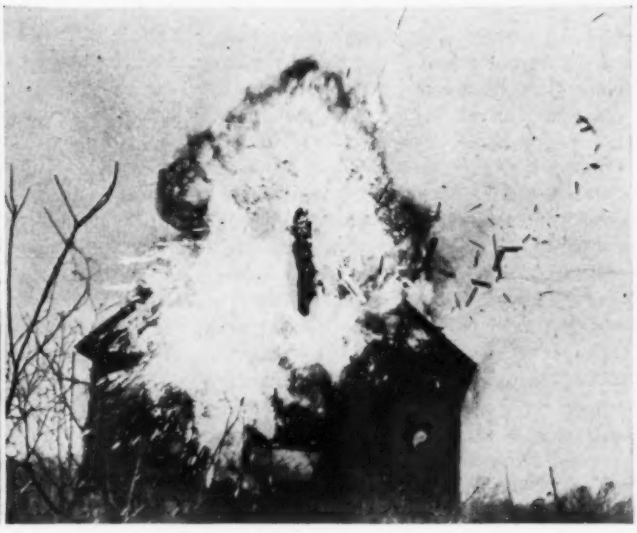
The M50 four-pound magnesium bomb, similar to British and German models, looks like a metal ingot, 21 inches long and two inches in diameter, hexagonal in shape. It is constructed of an outer shell of cast metallic magnesium with a nose of either machined cold-rolled steel, containing a detonating charge, or of cast-iron, and filled with two incediary mixtures. These are thermate, which consists of commercial thermite, powdered aluminum, barium nitrate and petroleum oil, and first fire mix. When the bomb strikes, the fire mix ignites the thermate composition, which burns fiercely for one minute at about 5400° F. The molten magnesium, which is the principal incendiary agent, burns for 10 to 15 minutes. During combustion of the thermate, the bomb reacts violently: jets of flame are emitted from vent holes, and particles of molten magnesium which are extremely difficult to extinguish, may be hurled as far as 50 feet. The thermate, because it supplies its own oxygen, cannot be extinguished by water or sand.

The M69 six-pound jellied gasoline bomb, resembling a piece of hexagonal pipe, works like a miniature flamethrower, expelling globules of flaming jelly 25 yards from its tail. The center portion of the 19-inch steel casing holds a cheesecloth sock containing about three pounds of jellied gasoline. Folded in a depression in the tail are four lengths of cotton gauze, 40 inches long and three inches wide, which break free as the bomb falls and act to improve the aim, and as a drag, slowing the descent to prevent the bomb from smashing to pieces when it lands, yet providing sufficient force to pierce tile, slate, wood, or galvanized iron roofs. After the bomb lands a delay fuse starts a mechanism which explodes after about three seconds and coughs the jelly-filled sock out of the tail in the hollow casing. The gobs of fire which strike against walls and under the eaves of targets cling to the surface, burning for eight to ten minutes. Jellied gasoline, the same substance fired by the CWS flamethrower and flamethrowing tanks, is 80-octane motor vehicle gasoline mixed with a special thickening compound which slows up the burning time and makes it of a viscous and gummy consistency. The mixture looks like orange gelatin and burns at about 3,000 F.

Another jellied gasoline bomb, similar to the M69 in every respect but size, is the M47, which weighs a hundred pounds. The cylindrical steel body is 45 inches long and eight inches around. On impact the thickened gasoline filling is scattered over an area 40 yards in diameter.

Biggest of all incendiaries is the M76 "goop" bomb, or "blockburner." The pyrogel, or "goop" filling, is a blend of violently flammable chemicals including crude magnesium dust, liquid asphalt, jellied gasoline and other oils. The magnesium is obtained as a residue from production of high-grade magnesium metal by the Hansgirg process. "Goop," or synthetic lava, is a tough, rubbery material that burns with an intensely hot flame. The mixture combines the good features both of jellied gasoline, which scatters into hard-to-reach corners of structures, and of magnesium, which concentrates a white-hot flame on the target.





Shown below are six U. S. soldiers loading M50 magnesium bomb clusters in England. At right, above, M47 100-pound jellied gasoline bombs fall from bomb bays on an enemy target at Bremen, Germany. Below, right, an M47 burst on a simulated enemy factory

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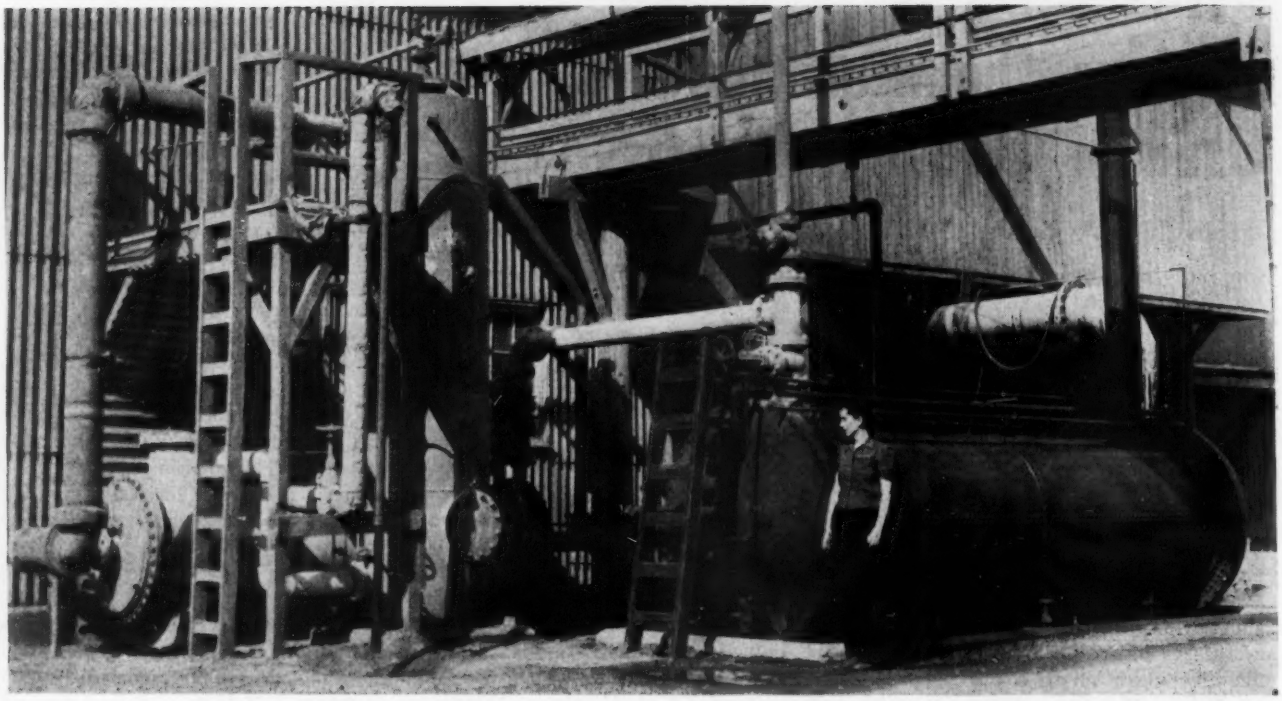
that a concentration of over 100



Unit for the production of nitrogen from nitric acid plant tail gas, horizontal heat exchanger at the left, vertical burner in the center, discharging into the horizontal cooler at the right.

NITROGEN PRODUCTION

from Waste Nitric Acid Plant Tail Gas

by G. S. ORTNER and J. N. ROBINSON, Research Department,
Consolidated Mining and Smelting Co., of Canada Ltd., Trail, B. C.

WASTE NITRIC ACID plant tail gas, containing 95% nitrogen, is now being used for the large scale production of high-purity nitrogen, suitable for use in the synthesis of ammonia, by removal of the oxygen-containing constituents with electrolytic hydrogen.

THE expansion of ammonia production necessitated by the war called for an immediate increase in nitrogen supply at the Consolidated Mining and Smelting Company's ammonia plant at Trail, B. C. For a time this increased nitrogen production was met by burning hydrogen in air, condensing the water vapor and utilizing the pure residual nitrogen after scrubbing out carbon dioxide with an alkali solution. This, however, was an extremely costly process, consuming electrolytic hydrogen equivalent to 2,370 KWH per ton of nitrogen produced. The Claude process for the liquefaction and fractional distillation of air, which prior to 1940 had supplied nitrogen for ammonia synthesis, has a power consumption of only 176 KWH per ton of nitrogen.

Early in 1941 six Chemico nitric acid units, constructed on behalf of the Allied War Supplies Corporation and operated by Consolidated, came into production. At full load some 18,000 c.f.m. of tail gas were vented to the atmosphere from these units.

In the manufacture of nitric acid by the catalytic oxidation of ammonia, the following sequence of reactions is usually recognized as taking place:

$$4NH_3 + 5O_2\ (air) \longrightarrow 4NO + 6H_2O$$
$$4NO + 2O_2\ (air) \longrightarrow 4NO_2$$
$$4NO_2 + 2H_2O + O_2\ (air) \longrightarrow 4HNO_3$$

Some excess air is always used to ensure adequate oxidation of NO_2, so that the residual gas, after absorption of an economic proportion of nitrogen oxides, has the following approximate composition:

N_2 =	95.3% (by volume)
O_2 =	3.2
$NO + NO_2$ =	0.3
CO_2 =	0.04
A =	1.1

Because of the urgent need of a cheap source of supplementary nitrogen, reduction of this gas with hydrogen to remove all the oxygen and oxides of nitrogen looked like an attractive proposition. Assuming the nitrogen oxides to be present as NO_2, the hydrogen requirement for complete reduction to nitrogen and water would be equivalent to only 320 KWH per ton of nitrogen produced, about 1/7th that required when burning hydrogen in air to give nitrogen.

The few literature references that were found referred principally to the process patented by Fauser (1). A copper catalyst operating at a temperature of 450-600° C. and a space velocity of 800 reciprocal hours was indicated. Another approach to the space velocity required is provided by the data of Hinshelwood and Green (4) for the homogenous reaction.

$$2NO + 2H_2 \longrightarrow N_2 + H_2O$$

Their results indicate a reaction time of several days would be required to reduce NO to 10 p.p.m. even when using very high temperatures, making a good catalyst necessary.

Elimination of oxygen from the mixture was considered to be relatively easy. The important task being to ensure the reduc-

tion of nitrogen oxides to a point where there would be no danger of corrosion of the expensive high pressure equipment used in ammonia synthesis. The information available was limited to the statement that 0.02% nitric oxide in the nitrogen-hydrogen mixture was sufficient to put a compressor out of order in a few hours.

Thermodynamic study of the four most probable reactions:

$$2NO + 2H_2 \longrightarrow N_2 + 2H_2O$$
$$2NO_2 + 4H_2 \longrightarrow N_2 + 4H_2O$$
$$2NO + 5H_2 \longrightarrow 2NH_3 + 2H_2O$$
$$2NO_2 + 7H_2 \longrightarrow 2NH_3 + 4H_2O$$

showed that in all cases the equilibrium concentration of NO or NO_2 lay far below a measurable amount at the temperature anticipated, so that the problem was simply to attain a sufficiently great reaction velocity.

PILOT SCALE WORK

A few laboratory experiments in a quartz tube showed that a copper wool catalyst was quite active, and a pilot scale plant, sufficiently large to hold about 0.25 cu. ft. of catalyst, was laid out.

The temperature which would be attained for various amounts of oxygen in the tail gas was calculated and is shown in Fig. 1. It was known that the oxygen content varied considerably between 2.0 and 4.0%, so a heat exchanger and bypass were incorporated in the pilot plant for temperature control.

After a few weeks of experiment with the pilot plant, the following conclusions were reached:

(a) Coarse copper shavings, copper raschig rings and firebrick impregnated with 2% copper were all active catalysts.

(b) The optimum temperature was 600-650° C. (approximately 1100-1200° F.). This was not quite in accord with Fauser who claims that 600° C. should not be exceeded.

(c) Space velocity of the order of 6000 reciprocal hours was possible with the product containing less than 5 p.p.m. NO.

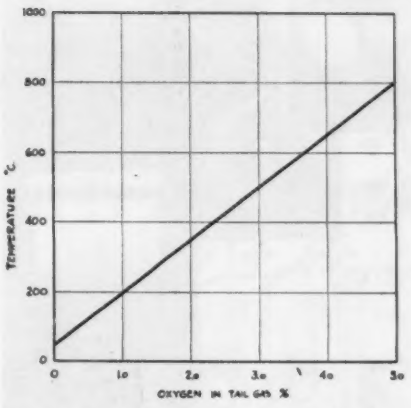


Fig. 1. Temperature increase resulting from the reaction of tail gas containing 0.3% NO_2 and varying amounts of oxygen with sufficient hydrogen to give 4% hydrogen in the product.

(d) Increasing pressure increased the reaction rate. Using tail gas at approximately 32 p.s.i. and operating the burner at 15 p.s.i. would allow ample pressure to send the gas approximately ½ mile through scrubbers and into a gasholder at the ammonia Plant.

(e) Increase in excess hydrogen increased the reaction rate: 3-5% excess was very satisfactory.

(f) Steady control of temperature and excess hydrogen was difficult due to fluctuation in oxygen content of the tail gas.

(g) There was very little conversion of carbon dioxide to carbon monoxide by the reaction

$$CO_2 + H_2 \longrightarrow CO_2 + H_2O$$

This was quite important because both carbon dioxide and carbon monoxide are detrimental to the catalyst used in ammonia synthesis. The former, carbon dioxide, is easily removed by scrubbing with caustic while removal of carbon monoxide is more difficult and expensive. Calculations had shown that a concentration of over 100 p.p.m. carbon monoxide was possible if equilibrium were reached in this reaction with 5% excess hydrogen at 650° C. The carbon monoxide actually produced was of the order of 10 p.p.m., tolerable in ammonia synthesis.

(h) Oxygen content of the reduced gas was less than 0.1% and the small amount of ammonia formed would not be deleterious.

(i) Mild steel was a satisfactory construction material for handling tail gas above its dew point. Below the dew point stainless steel was necessary to prevent corrosion.

The produced gas, of course, was not corrosive. This point was checked by extended corrosion tests using steel, cast iron and brass specimens.

CONSTRUCTION OF A COMMERCIAL UNIT

The above data seemed to fully justify construction of a full scale commercial unit. It was also obvious that time and equipment shortages would require the most to be made of available scrap and idle material.

The lay-out of the plant is shown in Fig. 2. The burner, or reaction vessel was made of mild steel, lined with firebrick and contained a depth of 8 ft. of catalyst or approximately 25 cubic feet. The heat exchanger was borrowed from a large forced-circulation crystallizer not in use at the time, and was made of an 18-8 stainless steel. Pipelines before the heat exchanger were 18-8 and those handling hot gas were of mild steel. All equipment was designed to carry at least 25 p.s.i., the maximum allowable working pressure on the heat exchanger.

Trial Operation. As soon as the heat exchanger and burner were erected, a three week trial run was made, venting the gas produced to air.

At first a catalyst of firebrick impregnated with about 1% copper was tried. This proved rather inactive and its heat conductivity was so low that the upper

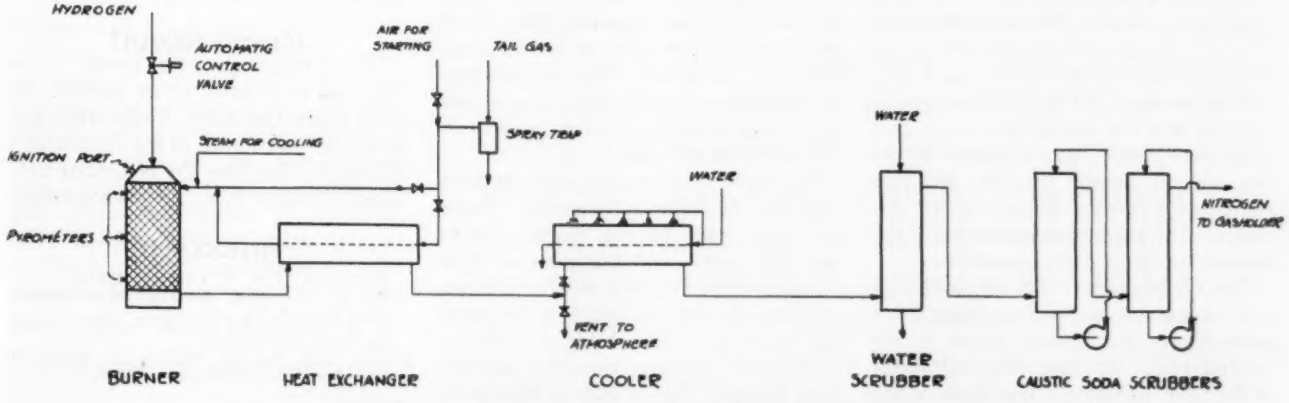
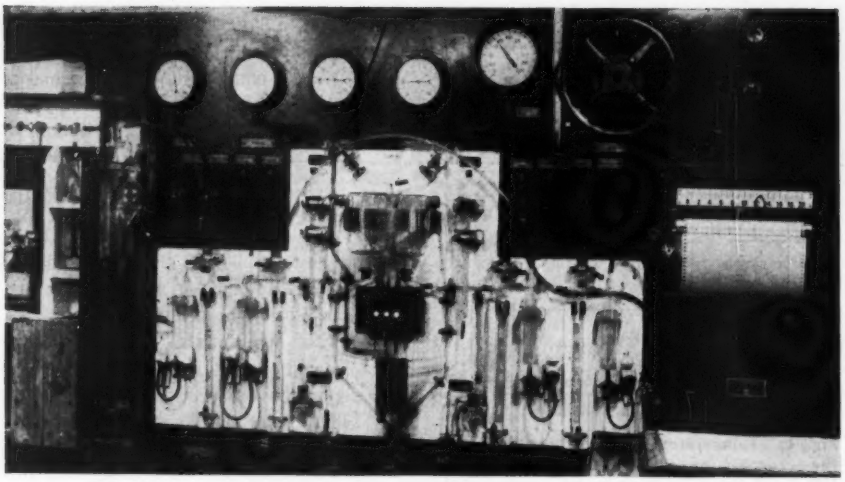


Fig. 2. Flow diagram of nitric acid plant tail gas burner.



Operating panel board with an Orsat for the determination of oxygen and hydrogen at the left, a continuous indicating NO analyzer in the center, and an instrument to record residual hydrogen in the product at the right.

surface would not remain sufficiently hot to initiate the reaction between oxygen and hydrogen. It was replaced with small bundles of heavy copper wire and bars of scrap which proved quite active after two or three successive oxidation and reduction cycles. The NO content of the finished nitrogen could be consistently kept below 10 p.p.m. in spite of a deliberate and drastic variation of conditions. It was found that high temperatures occasioned by high O_2 content could be successfully controlled by addition of steam to the inlet.

After these trial runs the rest of the plant was installed. The cooler, to cool the gas from about 500° C to 30° C, under conditions of no heat exchange, was fashioned from an intercooler taken from a large air compressor from an abandoned mine. Advantage was taken of a 6" diameter pipeline existing for some 1400 ft. of the 2000 ft. between the nitric acid and ammonia plants and second-hand 10 in. pipe was used for the remainder of the run to the ammonia plant. Here, three existing scrubbers were utilized. These had formerly comprised part of the equipment for burning hydrogen in air. The first was used as a water scrubber to remove the small amount of ammonia produced in the reduction of tail gas as this was felt to be detrimental to the lubrication of the large compressors used in the ammonia plant. The other two scrubbers were used for removal of carbon dioxide by an 8-10% caustic solution. At first carbon dioxide removal was not satisfactory, so raschig rings were dumped into the second scrubber, without altering the plate and ring construction, greatly improving its efficiency. The gas then passed to one of the existing ammonia plant gasholders.

The tail gas burner was provided with a recording pyrometer registering three temperatures at different points in the catalyst mass. An indicating instrument of the color comparison type to show the NO present in the nitrogen produced was built similar to one described by Fulweiler (2). An instrument was ordered to record and control, at a constant predetermined figure, the excess hydrogen present in the produced gas, but the plant was operated by frequent Orsat analysis for several months while awaiting delivery of this instrument. A few flowmeters comprised the remainder of the instrumentation.

Operating pressure was set at 15-20 p.s.i. gauge.

The amount of excess hydrogen in the exit gas from the burner was set at 3-5%. More hydrogen would have been beneficial, but it was necessary on occasions to use a small portion of the produced gas for purging hydrogen from equipment before working on it, so an upper limit of 5% was set as a safety precaution. At this concentration there is no combination of pressure, temperature, or concentration at which the gas is flammable even when mixed with pure oxygen in any proportion. It should be noted, however, that the excess hydrogen used in the burner is, of course, recovered in the nitrogen produced, since this nitrogen is used for ammonia synthesis.

Full Scale Operation. On the whole, the plant worked very satisfactorily from the start. It was found that the burner would produce up to 2400 c.f.m. of nitrogen containing less than 8 p.p.m. NO, but the line to the ammonia plant would only handle 1800 c.f.m. at the pressure differential available. This rate amounts to approximately 100 tons nitrogen per day, the equivalent of two of the existing Claude liquid air units.

Catalyst. The metallic copper catalyst was not altogether satisfactory. There was a tendency for the coarse wire to gradually settle until the pressure drop across the mass became excessive. On two occasions the ammonia feed to a nitric acid unit was cut down causing a large increase in the oxygen content of the tail gas from the unit. Due to lack of experience in operating the burner this resulted in fusion of the copper mass and difficulty in removal. Eventually the metallic catalyst was replaced with a porous insulating brick containing 8% copper. A few inches of heavy copper bars were placed above the brick since the refractory catalyst did not have sufficient heat conductivity to maintain the necessary temperature. This arrangement has been very satisfactory.

Product. The gas produced has the following average composition:

$N_2 = 95\%$
$A = 1\%$
$H_2 = 4\%$
$O_2 = 0.1\%$
$NH_3 = .01\%$
NO = 10 p.p.m. : 15 p.p.m. permissible
CO = 15 p.p.m. : 25 p.p.m. "
CO_2 = 15 p.p.m. : 30 p.p.m. "

In case the amounts of NO, carbon monoxide and carbon dioxide seem rather high, it should be borne in mind that in the worst possible case the nitrogen will be diluted with three times its volume of pure electrolytic hydrogen, so that the mixture as fed to the compressors will contain less than 5 p.p.m. of each impurity.

The plant has now operated for three years with not the least evidence of corrosion due to nitrogen oxides in any of the equipment subsequent the burner.

The total cost of the plant including all equipment and pipe lines was about one-twelfth the cost of two liquid air units with a comparable capacity.

The actual course of the reaction is believed to result first in the formation of ammonia and its subsequent decomposition to nitrogen and hydrogen.

$$2NO + 5H_2 \longrightarrow 2NH_3 + 2H_2O \quad (1)$$
$$2NH_3 \longrightarrow N_2 + 3H_2 \quad (2)$$

The reason for this belief is that the ammonia content of the product in all cases lies above the equilibrium value for reaction (2) and the higher the velocity over the catalyst, the higher the ammonia content of the product.

It is interesting to note that the data obtained in the pilot plant over a copper catalyst check the observation of Hinshelwood and Green that the reaction between NO and H_2 is termolecular (3,4).

ACKNOWLEDGMENT

The development of this process is the result of cooperative effort between the staffs of the Operating, Engineering, and Research Departments of the Consolidated Mining and Smelting Co. of Canada Ltd., whose assistance is hereby acknowledged.

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This article is a condensation of a paper delivered before the Chemical Institute of Canada, June 5, 1945, Quebec, P. Q.

HIGH VACUUM TECHNIQUES

Open New Fields For Chemical Industry

by HOLGER C. ANDERSEN, Jersey City, N. J.

WITH PRESENT METHODS, vacuums hitherto unattainable in large equipment except at prohibitive cost, are finding commercial application in such divergent fields as the production of metallic magnesium and the purification of the vitamin content of fish liver oils. Although some of the applications mentioned here are more in the intermediate vacuum range than in the "high vacuum" range as defined below, they have been made economically feasible by the newer high vacuum techniques.

THE development of highly efficient pumping equipment, and the demands of a highly technological war, have opened broad fields to the commercial utilization of high vacuum, as vacuums hitherto impractical, except in the laboratory, may now be secured with comparative ease and at low cost. This development has been so rapid that its potentialities are unknown to a large segment of industry. "Vacuum engineering," although still in its infancy, has begun to take its place alongside other established operations for such diverse uses as the purification of vitamins, the production of magnesium, and the drying of blood plasma.

Present industrial practice may be divided broadly into two types of processes: distillation and exhaust processes. Subdividing molecular distillation further, we may consider two general types of distillation techniques: those applied to substances which decompose at the temperatures required in ordinary distillations, and those applied to thermally stable materials usually considered non-volatile. In exhaust processes, processes involving the removal of air or gas may be distinguished from those effecting removal of liquids such as water. It will of course be recognized that these categories cannot be mutually exclusive; however, they provide a convenient basis for the discussion of modern practice. It should be emphasized that such a classification by no means limits the possibilities of application, as new uses for high vacuum which defy arbitrary classification according to these concepts are constantly arising.

MOLECULAR DISTILLATION

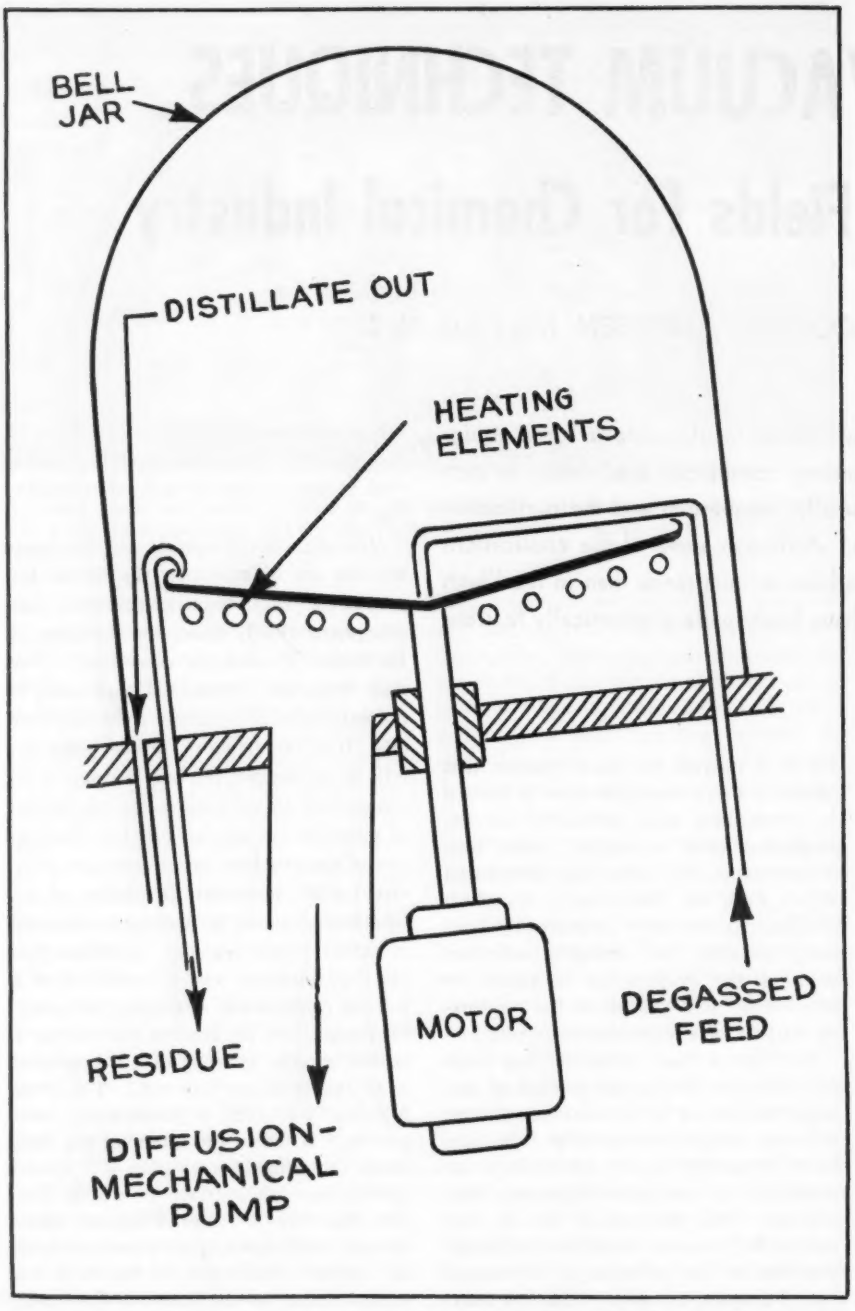
Molecular distillation receives its name from the fact that evaporation is carried out in a vacuum so nearly perfect that (almost) every molecule travels toward the condensing wall unhindered by the presence of other molecules. Under such circumstances, two important phenomena occur: first, the temperature at which distillation takes place is markedly lowered; secondly, the straight, unbroken paths of the evaporating molecules or atoms result in a deposit on the condensing surface of exceptional uniformity.

The first of these properties has made the molecular distillation method of immense importance in the treatment of high molecular weight heat-sensitive materials, which frequently are not amenable to atmospheric or even reduced-pressure distillation. This application has in fact come to be known as molecular distillation somewhat to the exclusion of the second type of process, but as we shall see later, the production of thin uniform films of "non-volatile" materials must be considered at least a type of molecular distillation.

Heat-Sensitive Materials. In this country, the art of molecular distillation for processing heat-sensitive materials has progressed chiefly under the direction of Hickman (1) and his coworkers. The most important commercial application is the extraction of vitamins from fish-liver oils. It is interesting to consider some details of the method, not only because of its commercial significance in the production of vitamins, but also because it is illustrative of the problems and advantages associated with molecular distillation of all substances. In one form of apparatus used in actual production (2), Hickman employs an ingenious system consisting of a bell-jar continuously evacuated by powerful pumps. At the base of the bell-jar a heated, rapidly spinning disc is employed as an analog of the "still-pot." The crude fish-liver oil, after a preliminary "outgassing," is fed to the center of the disc, where centrifugal force causes it to spread quickly over the surface in a thin film. The thin film is required because high-vacuum evaporation takes place only from the *surface*; molecules in the bulk are wasted insofar as distillation is concerned,

HOW HIGH IS HIGH VACUUM?

The term, high vacuum, as generally employed, refers to a pressure at which the average travel of the molecules between collisions is at least of the same order of magnitude as the size of the container. An important consequence of this definition, and one which is often overlooked, is that a pressure constituting high vacuum in one piece of equipment may not represent high vacuum in another. For example, in order to say that a 1-foot vessel is under high vacuum, the pressure must be at least 0.2 micron; but for a 10-foot vessel, the pressure must be less than 0.02 micron.



The oil feed to the centrifugal molecular still first passes through a degassing stage to remove non-condensables and then enters the still where it is fed to the center of an electrically heated rotating disc. Here the feed distributes itself in a thin uniform layer over the disc where under the vacuum (about 1 micron) maintained, the volatile constituents evaporate from the oil surface and travel in practically unimpeded paths to the bell jar surfaces where they are condensed. The residue is removed by a tube projecting into the gutter of the disc.

and are merely susceptible to decomposition by heat. The high-speed disc ensures an extremely short exposure of the sensitive compound to the distillation temperature. The more volatile molecules from the oil surface pass through the evacuated space, and strike the cool walls of the bell-jar, where they condense and pass to a receiving vessel. Meanwhile, the less volatile constituents are spun out to the rim of the disc and are removed as waste or retreated to obtain another fraction. The distilled vitamin obtained by such a procedure is extremely bland, odorless, and nearly colorless. Actually, it is not the pure vitamin, but rather a potent concentrate which is obtained. According to a recent article (3), 80 to 160 pounds of oil can be processed per hour per unit with equipment then available, and the larger stills now in operation handle as much as a half-tank car full of crude fish liver oils per day. Olive (2) indicates that over 5,000,000 pounds of fish liver oils were distilled in 1943 in the United States alone.

Besides the tremendous quantities of vitamin A concentrate being produced by molecular distillation, other vitamins, notably D and E, are receiving attention. Experimental work has shown that many other refractory substances can be handled by this technique. Detwiler and Markley (4), for example, list some of the uses: separation and purification of long-chain hydrocarbons, alcohols, fatty acids, esters and glycerides; separation of polymerized and unpolymerized fractions of vegetable fats and oils; purification of amino acids, sterols, and hormones; production of anhydrous enzyme preparations; separation of organic salts of the rare earth metals.

Although limitations and disadvantages of high-vacuum methods will be discussed at the end of the article, it is well to describe some of the early shortcomings which the molecular still has had to circumvent. As a process, it is relatively inefficient, due to the large thermal losses, and it has poor fractionating characteristics. But the capital investment per unit of throughput of total material is moderate enough to permit application of the process a number of successive times without exceeding reasonable costs.

Although the method has thus far been used principally on materials of high unit value, such as vitamins, it is now rapidly being extended to materials of low unit value, such as plasticizers and crude oil.

The *raison d'etre* of molecular distillation, namely its ability to handle sensitive substances without decomposition, covers a multitude of sins, and in many cases this fact alone is sufficient to counter economic disadvantages in many useful cases.

Non-Volatile Materials. Most of us are wont to divide materials into two groups: substances which can be made to boil or evaporate, and those which are essentially non-volatile. Generally, metals and salts fall in the latter group. However, a glance at some of the substances now being distilled under high vacuum suggests a modification in our concepts of volatility: magnesium fluoride, aluminum, magnesium, gold, calcium fluoride, cryolite, silver and chromium are only a few of the low-vapor pressure materials which are successfully evaporated under high vacuum. The developments in this field have had particular significance for the metallurgical, optical, and electronic industries.

One of the striking high-vacuum developments during the war has been intimately concerned with the metallurgy of magnesium. In the ferrosilicon process due to Pidgeon, magnesium oxide is reduced by ferrosilicon in an alloy-steel tube under high vacuum and at high temperature. In a typical production cycle, a high magnesium dolomite is burned and admixed with the ferrosilicon, and the mix briquetted. The briquets are then charged into special retorts which are exhausted by high-speed pumps. As heat is applied to the retort, the magnesium is released by chemical interaction and under the high vacuum, the pure metal actually distills from the hot zone of chemical reaction to the water-cooled end. When reaction is complete, the retort is cooled, air

admitted, and the pure crystalline metal removed (5). Acording to figures recently released (14), a total capacity of 138 million pounds of magnesium is available annually by this method from government-owned plants. Although this figure is a relatively small fraction of the total reported capacity (586 million pounds per year), the process is important in that it presages a new branch of metallurgical refining. The production cost (6), exclusive of depreciation and obsolesence, from plants where figures are available ranges from 18.3 cents per pound to 22.2 cents per pound for the Pidgeon Process plants as compared to a range of 11.5 cents per pound to 20.3 cents per pound by the electrolytic method. Although the vacuum reduction method does not compare favorably in cost with the electrolytic process, it is quite probable that this general type of process will eventually become an accepted production technique, especially in the metallurgy of unusual or expensive metals.

Large-scale vacuum producing equipment is abetting a minor revolution in the treatment of glass surfaces in the optical industry. Practically all optics for military use are now coated with a microscopically thin film of a transparent salt which greatly reduces the amount of light reflected from the surface. The decrease in reflectivity is converted into increased transmission. While the effect is small for a single lens, it becomes amplified in systems such as binoculars, telescopes, gunsights, and range finders, in which the light must traverse many glass-air interfaces. In such systems, the light transmission may be increased by as much as 50%, and the confusing multiple reflections known to optical men as "ghosts" are almost completely eliminated. "Lens coating" (7), as the process is often termed, is generally carried out in large bell-jars evacuated to a pressure of 0.0001 millimeter of mercury, or less. In one representative method, magnesium fluoride or other salt of low refractive index is evaporated from a white-hot tungsten filament. The salt molecules travel in the characteristic straight, unimpeded paths of molecular distillation and condense on the optical surfaces in an exceptionally uniform and optically efficient film. Evaporation is continued until the reflected light is a delicate red-violet color; this condition results in the maximum transmission. In contrast with the films produced by other methods, such as dipping, the film produced by high-vacuum evaporation is extremely tough, adherent, and durable.

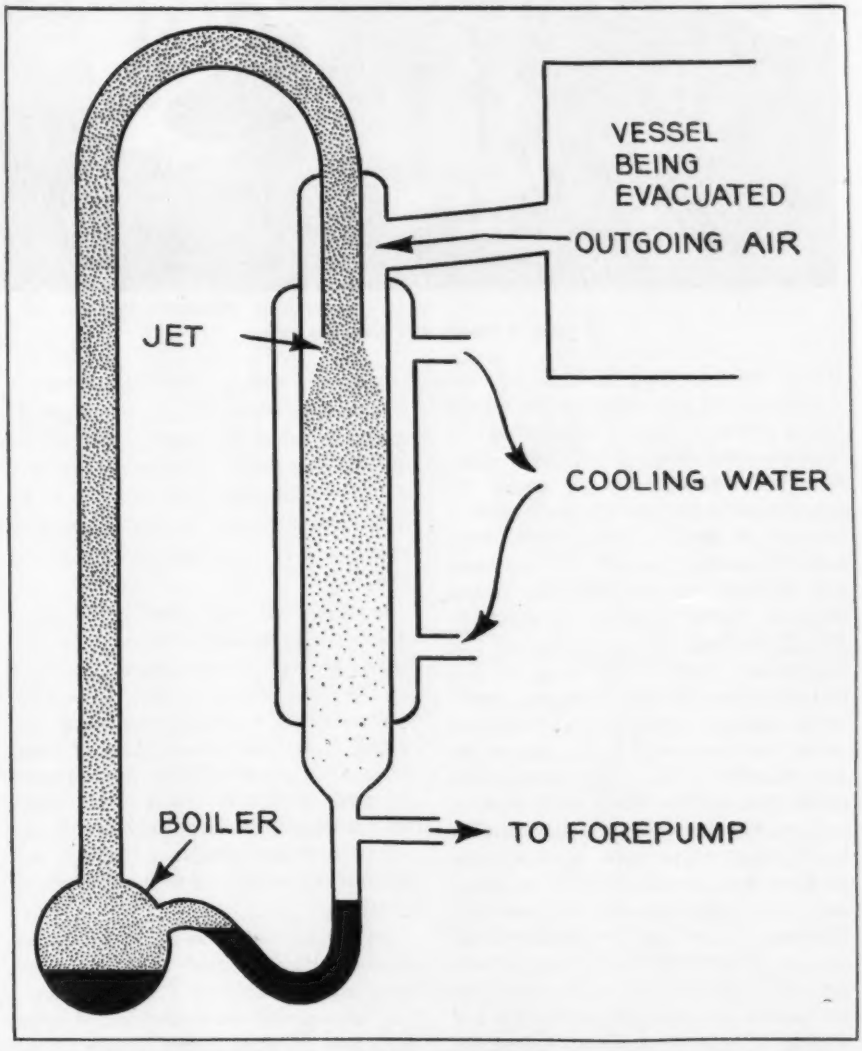
A very similar, but somewhat older process is being used with great success for attaining the opposite goal, namely that of producing highly reflecting surfaces. Mirrors of superior optical qualities are now being made in large numbers by evaporating aluminum and other bright metals onto "optical flats." Although the vacuum method cannot, at the present stage of development, compete economically with chemical silvering processes, the properties of the "front surface mirror" are sufficiently superior so that price competition is inoperative in many cases. This is especially true of precision optical devices, such as interferometers, infra-red spectographs, and machine-tool comparators. In the range of visibility intermediate between complete reflection and complete transmission, instrument makers are finding it advantageous to produce semi-transparent films by high-vacuum evaporation processes. For this purpose, the evaporation is merely stopped when the lens is transmitting the desired fraction of incident light.

An adaptation of these techniques is being applied in the electrical and electronic industries, with a considerable measure of success. Quartz oscillators are now being silver and gold coated by high vacuum evaporation. A thin, uniform, adherent film, to which the necessary conductors can readily be soldered, is produced by this method. The film is so thin and uniform that the vibrational characteristics of the oscillator are unaltered by the deposition of metal. Rectifier elements are processed in a similar manner.

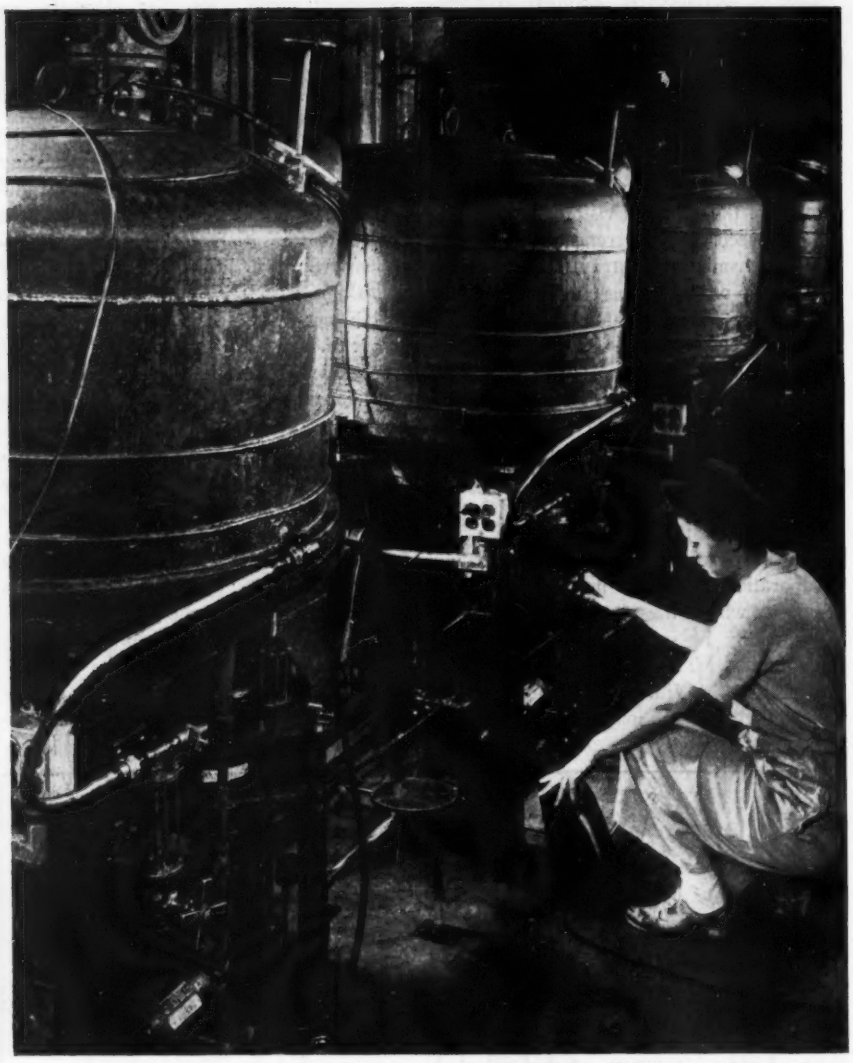
EXHAUST PROCESSES

One of the important problems in the electronics industry is that of exhausting thermionic devices. For ordinary radio receiving tubes, a rough pumping is often sufficient for satisfactory operation. Frequently the rough vacuum is improved by "flashing a getter" such as an alkaline earth metal in the evacuated tube, to remove most of the residual nitrogen and oxygen. But for the newer tubes, which are appearing in increasing variety and quantity, such procedures are seldom satisfactory. Radio transmitting tubes, X-ray tubes, photoelectric cells, and many developments still enveloped in secrecy require vacuums of the order of 0.000001 millimeter of mercury or better. It was the anticipation of such requirements which was largely responsible for the development of the mercury diffusion pump by Irving Langmuir (8).

Probably the most important of the newer trends in this field is the substitu-



In the diffusion pump mercury or a special oil, having a low vapor pressure, is heated in the boiler. The vapors formed rise and leave the jet at high velocity, sweeping any gas present into the forepump, the gas molecules above the jet diffusing downward into the vapor stream because of the concentration gradient thus formed. The mercury or oil vapor is then condensed and recycled to the boiler.



Courtesy Distillation Products, Inc.

Battery of commercial molecular stills.

tion of other pumping fluids for mercury. As Morse (9) has indicated, the oil diffusion pump is rapidly supplanting the mercury diffusion pump because it eliminates the necessity for cold traps. At room temperature, mercury itself exerts a pressure of about 1 micron (0.001 millimeter of mercury), which thus represents the ultimate vacuum attainable unless traps are cooled in dry-ice or liquid air. The disadvantage of traps is not only that they require costly refrigeration, but also that they decrease the "pumping speed" of the vacuum system by the obstruction which they necessarily create against the free diffusion of air. The hydrocarbon fluids developed by Burch (10) in England and the esters used by Hickman (11) in the United States have such low vapor pressure that no cooling device is necessary with pumps operating on these oils. Pressures as low as 10^{-8} millimeter of mercury (0.00000001) have been attained with these new fluids, in pumps providing for continuous automatic purification and voiding of lighter fractions. Among the many applications open to the new types of equipment are the exhaust of television and cathode tubes, mass spectrometers, and special lamps. In devices operating on mercury, such as ultra-violet lamps, it is doubtful whether any advantage is gained by using oil instead of mercury as the pumping fluid. In some devices, too, the oil film diffusing from the pump is objectionable, although "baking" of the tube usually prevents the formation of an oil film.

Brief mention must suffice for the many other uses of vacuum equipment for exhaust purposes: vacuum sealing processes in the food industry, and large-scale evacuation of industrial equipment for testing of leak-tightness. Many of these applications are actually not high-vacuum processes in the strict sense of the word, but are intermediate type applications, requiring equipment similar to that used for high-vacuum work. As such, they deserve mention.

An example of processes intermediate between "high vacuum" and "low pressure" was furnished by the sudden wartime demand for the production of large quantities of dried blood plasma. The donor blood is separated into plasma and solid constituents by centrifuging and the plasma frozen and loaded in trays into a cabinet which is exhausted by pumps. The water is evaporated and either pumped away by steam ejectors, or pumped into refrigerated traps placed between the vacuum chamber and the pump. Although moderate warming of the chamber, as high as 110 deg. C. is sometimes applied in order to hasten the evaporation, the delicate plasma constituents are never subjected to heat such as would be required by simply boiling off the water, since the heat supplied must exactly balance the heat removed as latent heat. A short time after the development of the plasma dehydration process, vacuum engineers applied very similar techniques in the final steps of penicillin production. The dry sodium salt remaining after the low-temperature evaporation is extremely stable against subsequent decomposition. Still another use of low-temperature dehydration processes lies in its application to food dehydration, which, for proper description, would require a complete article in itself (16).

EQUIPMENT

A bewildering array of equipment has been used, and is indeed still being used for producing high vacuums. In the field of pumps, perhaps a dozen distinct types have been used, and in various combinations. For industrial work, however, the choice narrows down considerably, owing to the necessity for large capacity, economy, and ruggedness. The principal industrial types are the following:

Mechanical vacuum pumps. In general, these derive their pumping action from a rotor revolving eccentrically within a cylindrical chamber in such a manner that gas is admitted into the void space at approximately its maximum volume, and expelled after compression into a small space. Highly-refined oils lubricate the mechanism and seal the clearances against back leakage. It is difficult to give a perfectly general statement of the limiting pressure attainable by mechanical pumps, since it depends markedly upon the mechanical condition of the pump and on the vapor pressure of the oil. Very roughly, however, it may be said that the decreasing capacity and thus expensive operation of most industrial mechanical pumps is prohibitive below a pressure of about 0.1 millimeter of mercury.

Steam-jet ejectors. In this type of pump, gas is entrained and swept forward by a high-velocity steam jet. Very high capacities may be obtained with such equipment, but even with several stages, an ejector becomes imperative below about 100 microns (0.1 millimeter of mercury). Their use is usually confined to pressures above 350 microns (0.35 mm. of mercury).

Diffusion pumps, known synonymously as condensation pumps. The diffusion pump is theoretically capable of producing perfect vacuum; actually, the

minimum pressure obtainable is equal to the vapor pressure of the pumping fluid at the point at which the lowest temperature exists in the vacuum system.

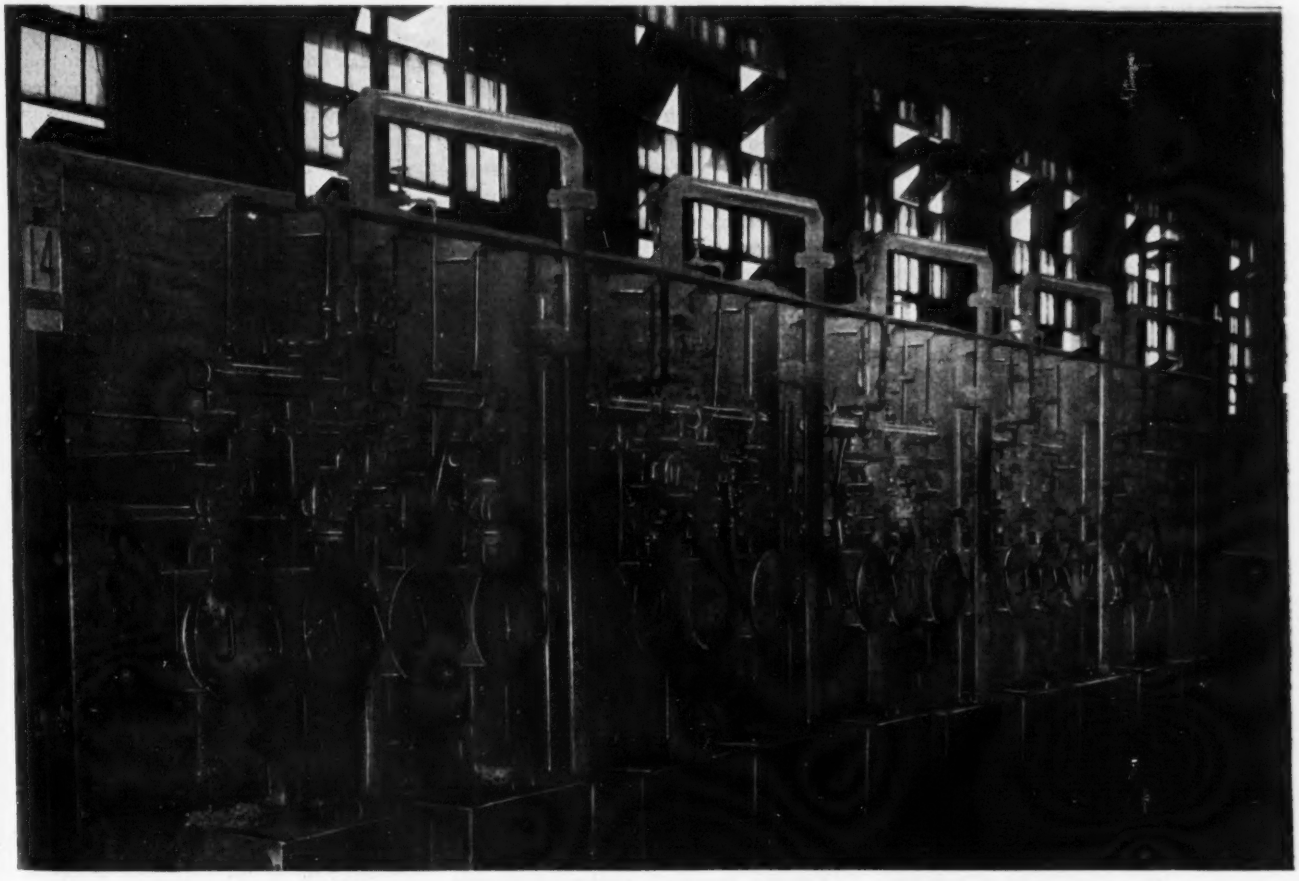
Since the diffusion pump is an important constituent of most vacuum systems, and indeed is demanded where truly high-vacuum is needed, a somewhat detailed description is warranted. Diffusion pumps have two important characteristics: they have large volumetric capacities (it should be noted that the tremendous volume handled by diffusion pumps actually represents only minute flows on a weight basis), and they require a low pressure into which to exhaust. They must always be used in conjunction with pumps producing a sufficiently good vacuum, known as the "backing pressure" of "forepressure." These pumps depend usually on the ejector or diffusion pump principle, but are modified somewhat to furnish greater speed at the sacrifice of ultimate vacuum. In the diffusion pump, a stream of mercury or oil vapor is supplied from a boiler; the vapor is made to emerge from a jet located centrally within a larger tube. The air molecules before the jet are swept away into the vapor steam, and are replaced by other molecules, which *diffuse* into the vapor stream through the annular space between the jet and the outer tube. The air swept through by the vapor is exhausted into the mechanical pump, while the vapor is condensed and returned to the boiler for further service. Although the process of diffusion of air from the annulus into the vapor stream would appear to be a very slow one, diffusion pumps are capable of handling huge volumes of gas at low pressure.

Reference has already been made to the fact that the use of oil in place of mercury introduces several important advantages for industrial use. As a further refinement, many designs of pump are now available which provide for continuous purification of the pump oil by automatic fractionation. The development of fractionating oil diffusion pumps, up to 1940, has been summarized by Hickman (12), and the possibilities are by no means exhausted. Diffusion pumps with capacities as high as 25,000 cubic feet per minute (at suction pressure) are now available on the market.

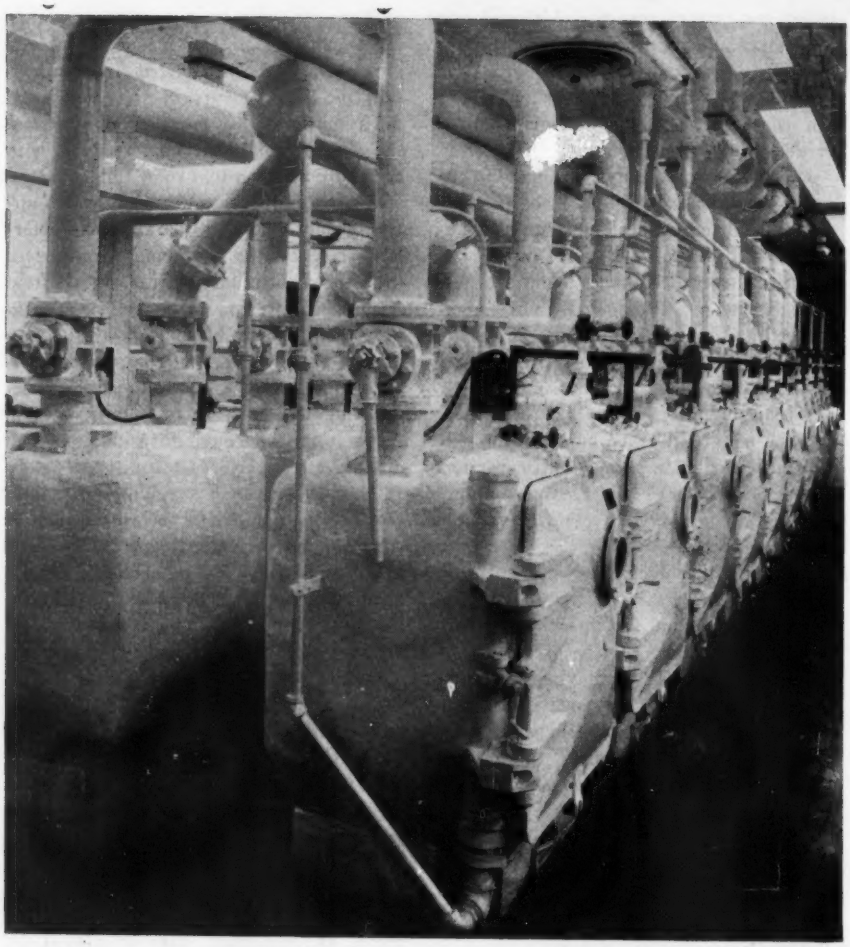
Although the mechanical and diffusion pumps are the heart of the most commonly used vacuum systems, the peculiarities of gases at very low pressures require careful consideration in the design of complete vacuum systems. First, the mechanical and diffusion pumps must be carefully sized with respect to one another; second, the piping must be carefully laid out so that the speed of the pumping unit is not unduly diminished by obstructions to the diffusive or "molecular" flow of gas; and finally, very special instrumentation is required to register the pressures.

Pump sizing is determined by the minimum capacity of the mechanical pump which must be available in order to obtain the full benefits of the high-speed diffusion pump. In practical applications, the vacuum engineer must contend with the additional fact that some time is necessary for the diffusion pump to "warm up" to the point where its operating characteristics are at the optimum. In modern high-speed installations for intermittent operation, diffusion pumps are kept running continuously by appropriate valving and by-passing. The mechanical pump is often purposely over-sized in order quickly to bring the pressure of a large system into a range where the diffusion pump can operate effectively.

The importance of supplying large lines between the pumps and the vacuum vessel cannot be overemphasized. Fortunately, much useful data is now available for determining the proper pipe size. For example, for a pumping unit having an inherent "speed" of 1000 cubic feet per minute at suction pressure (typical for a 6-inch diffusion pump) to operate with 90% efficiency at low pressure while exhausting a vessel ten feet from the pump, it is necessary that a straight run of pipe 18 inches in diameter be employed. Most operators actually prefer to take a somewhat greater sacrifice in pumping speed, in order to avoid the use of inordinately large piping. In connection with the sizing of equipment, an important part is played by



In the manufacture of metallic magnesium, magnesium oxide is reduced with ferrosilicon at a very high temperature under a vacuum sufficiently high to permit the distillation of the magnesium from the hot end to the cool end for condensation and final removal. The hot end, charging end, of one bank of tubes at the plant operated by the New England Lime Co. for Defense Plant Corp. is shown above.



Courtesy National Research Corp.

These drying cabinets and vacuum manifolds are part of the installation for vacuum drying of penicillin at Commercial Solvents' Terre Haute plant. The low temperature permitted by vacuum drying avoids decomposition of the heat-sensitive penicillin.

valves. Valves with large openings, and of extremely leak-tight construction, are a necessity for large installations. Most industrial valves and piping of large size are designed for high-pressure work, and are usually much heavier than necessary for the 15-pound maximum pressure differential encountered in vacuum work.

Because of the extremely low pressures encountered in high-vacuum work, ordinary pressure gauges measuring the difference between atmospheric and vacuum pressure are not suitable for high-vacuum work. The McLeod gauge, hot wire gauge, and ionization gauge are the most commonly used devices. In the McLeod gauge, a sample of gas is compressed to a known fraction of its initial volume, and the magnified pressure read by means of mercury levels. This has been adapted to give a continuous record of the pressure existing in a system, as can the hot wire and ionization gauges.

The Pirani gauge registers the correlation between pressure and heat conduction from a filament. Its practical lower limit is about 1 micron. The ionization gauge, which is capable of measuring the lowest attainable pressures, is a triode in which a constant flow of electrons from filament to grid is made to ionize residual gas molecules. The positive ions formed by electron collision register, in a suitable control circuit, as a plate current which is directly proportional to pressure, at pressures below about 1 micron. The McLeod gauge registers absolute pressure of permanent gases only; the electrical gauges register the true total pressure, but require calibration against an absolute instrument.

LIMITATIONS

Undoubtedly the most serious limitation to the use of high vacuum is that it is relatively an expensive process. The prospective user must always ask himself: Can the desired results be obtained by any other method? If the answer to that question is yes, then the probability is strong that the alternative method is the cheaper one. The reasons for the unfavorable economic position of the method are various: large and rather expensive equipment is required to process relatively small quantities of material; the processes themselves are usually rather inefficient (reference has already been made to the low thermal efficiency of molecular distillation); and skilled personnel is usually required for development and initial operation.

For this reason, a number of vacuum processes which have develcped under the stress of war will be unused in the face of severe postwar competition when considered on a pure cost basis. The magnesium process is one of these. Faced with a market oversupply and competition from electrolytic methods, the vacuum process has already been forced into retrenchment and will probably remain a high-cost source of supply, except where special purities obtainable only by the ferrosilicon process are required. In the plasma, penicillin, and food dehydration processes, similar blows will be dealt against the vacuum methods. A radio-frequency drying technique has been stated to be supplanting the freeze-pumping method in penicillin production (15). In the food field, ordinary hot-air dehydrating techniques will force vacuum methods out of existence except where the vacuum drying offers special advantages of flavor or vitamin retention.

While the prospective user must critically compare costs of alternative processes, extreme care must also be taken not to reject the high-vacuum method where it clearly produces a superior product. Probably the most important process against which other methods can rarely, if ever, offer quality competition is that of molecular distillation. Many laboratory discoveries in this field await profitable industrial exploitation.

Fortunately, too, the cost trend in equipment is downward, as it is with most branches of technology which are emerging from the laboratory into the engineering phase. Equipment is becoming more standardized, and a sufficient number of manufacturers is now established to indicate a reasonably competitive price trend in the postwar years. Also, simple and automatic instrumentation is tending to eliminate the need for operators of research ability.

Although it is possible that the end of hostilities will result in a certain decline in the rapid rate of development and application of high-vacuum in industry, it is unquestionable that its advantages will enable it to maintain a position of steady growth. The use of high vacuum by industry is here to stay.

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HEADLINERS in the NEWS

MAX A. LAUFFER has been awarded the Eli Lilly & Co. prize for achievement in biochemistry. Dr. Lauffer is University of Pittsburgh associate professor of physics.

FREDERICK T. WALL of the University of Illinois is the recipient of the 1945 American Chemical Society prize in pure chemistry; is provided annually by Alpha Chi Sigma.

JAMES G. PARK, elected president of the newly formed Chemical Market Research Group, is vice-president of Chemical Products Division of Standard Alcohol Company.

WILLIAM ILER BEACH of North American Aviation, Inc., was presented with the fourth annual John Wesley Hyatt award for outstanding achievement in the plastics industry.

RAYMOND B. SEYMOUR has resigned as group leader at Monsanto Central Research Laboratories to become director of Chattanooga Institute of Industrial Research.

DAVID W. HARRIS, recently president and general manager of the Arkansas Natural Gas Corp., has been elected president of the Universal Oil Products Company.

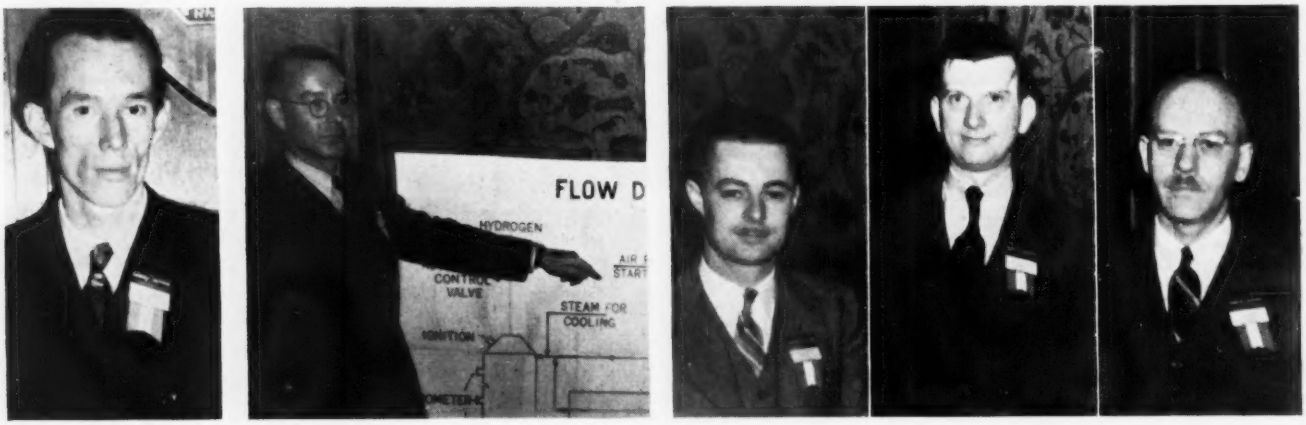
MAURICE H. LOCKWOOD, first chairman of the National Fertilizer Association under its new setup, is fertilizer research manager for Eastern States Farmers' Exchange.

ROBERT M. CRAWFORD has recently been named vice-president for development and research of the Durez Plastics and Chemicals, Inc., of North Tonawanda, New York.

Canadian Chemical Conference

The 1945 Conference of the Chemical Institute of Canada was held at the Chateau Frontenac, Quebec, June 4-6. A report of the meeting appears on page 154. Shown at left in the usual order are: L. E. Westman, chairman of the board of the Institute; A. F. Cadenhead, research director, Shawinigan Chemicals Ltd., retiring chairman of C.I.C.; R. R. McLaughlin, University of Toronto, new president of C.I.C.; and R. T. Baldwin, New York consultant, who was featured speaker at the Imperial Oil luncheon. Mr. Baldwin is a consulting editor of Chemical Industries.

Pictured from left to right at the Imperial Oil luncheon are: host, R. V. LeSueur, Imperial president; speakers, D. L. Thomson, McGill University; A. King, British Commonwealth Scientific Mission, C. J. Mackenzie, Nat'l Research Council and chairman, R. K. Stratford.



Speakers at the chemical engineering sessions were: J. D. Leslie, Nat'l Research Council. G. S. Ortner, see page 80; G. W. Govier, professor chemical engineering, University of Alberta; H. R. L. Streight, Canadian Industries Ltd.; and A. E. R. Westman, Ontario Research Foundation.

Above: C. A. Wright, Consolidated Mining & Smelting Co. Ltd.; J. D. Lorimer, May & Baker (Canada) Ltd.; H. D. Cameron, Oxygen Co. of Canada, Ltd.; V. G. Bartram, Shawinigan Chemical Co. Ltd.; Commander K. S. Maclachlan, president, Standard Chemical Co. Ltd.

Dow Colors New St. Louis Offices

The St. Louis branch of the Dow Chemical Co. has recently moved to the 18th floor of the 23-story Continental Building. Spaciousness and the use of brilliant colors are the themes which Alden B. Dow, designer of the offices, has effectively executed. The spaces are not entirely confined by solid walls. In Mr. Dow's words, "One space seems to develop into the next space, like one bend in a river develops into the next. This is accomplished by making certain partitions all of glass from the floor to the ceiling, or by completely covering solid partitions with mirrors. All of this results in the effect of added spaciousness, which, at the same time, sacrifices none."

Radiant reds, yellows, greens, blues and blue-greens make these rooms happy and invigorating. According to Mr. Dow, "In designing a livable space, all of the color nerves must be kept in mind, and care must be taken to relax and exercise all of them. This has been the objective in the color arrangement of the Dow offices and the effect is bound to be restful, and therefore pleasant."

Above right is a view through a portion of the general office to the chemicals room, left, and the magnesium division offices, right. Below, Glenn H. O'Neal, manager of the St. Louis branch is shown in his office. Notice the overhead lighting, which is used throughout the offices.

N. Y. Meeting A. C. S.

Several hundred chemists participated in the New York June "Meeting in Miniature," held at the Hotel Pennsylvania. Fifteen papers were presented by research workers from the educational institutions and industries of the metropolitan area. The gathering was one of a series which are being held by local sections of the society throughout the country as a result of the cancellation of the fall meeting scheduled for Chicago in September.

The afternoon session was opened with an address by Ross A. Baker, professor of chemistry in the school of business and civic administration in the College of the City of New York. Pictured above in the usual order are: Dr. Baker; W. J. Badgley, of the Polytechnic Institute of Brooklyn; William Seaman, in charge of the laboratory of analytical research, and J. J. Hugonet, both of the Calco Chemical Division of American Cyanamid Co., Bound Brook, N. J.

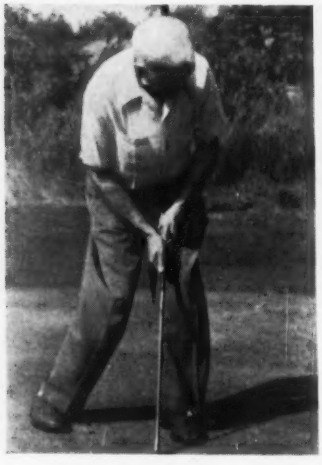
Shown below are: H. A. Frediani, chief chemist, with M. M. Acker, of the analytical laboratory of Eimer & Amend, New York; and Paul M. Doty and H. S. Kaufman, of the Polytechnic Institute of Brooklyn.

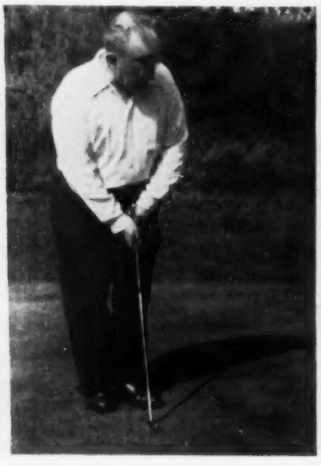
Chemists Club Holds Golf Tournament

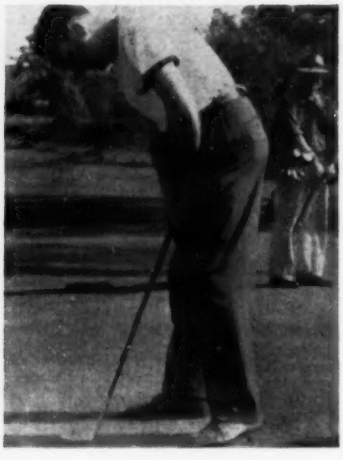
Members of the Chemists Club participated in the annual spring golf tournament last month at the Bonny Briar Country Club, Larchmont, New York. Seated at left is R. Heggie of the American Chicle Co., chatting with Wallace Cohoe, president of the Chemists' Club.

Charlie Frost, Prior Chemical Corp., presents the Chemical Salesmen's Asso. Trophy to winner E. B. Curtis, of R. T. Vanderbilt Co.

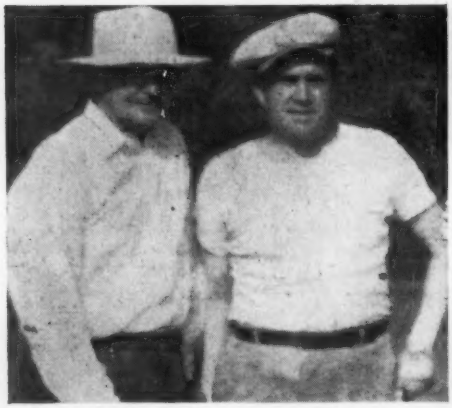
C. C. Stewart of the C. C. Stewart Paper Co., receives the Carleton Ellis Trophy from Welfare Committee Chairman Frost.



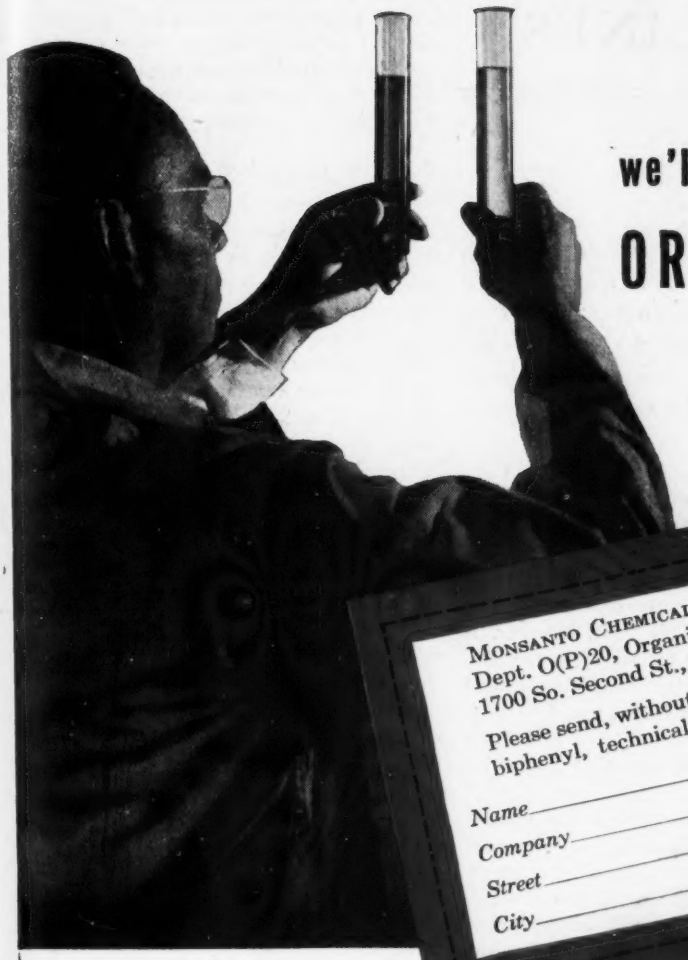




Photographed in action on the links from left to right are: Ira Vandewater, of R. W. Greef & Co., Inc.; Harold C. Green, of L. Sonneborn & Co.; Charlie Alexander, of L. Sonneborn, and Jim McInnes, of Commercial Solvents Corp.



Lined up on the green from left to right are: B. B. Watson, Prior Chemical Corp.; R. F. Murray, Anchor Hocking; W. B. Kuntz, Molybdenum Corp. of America. R. F. Bacon, New York consultant; A. Sherwood, Westvaco Chlorine, and H. B. Prior, Prior Chemical.



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You can use ortho-nitrobiphenyl as a plasticizer, alone or in conjunction with other plasticizers. It is applicable to the entire range of synthetic resins from the cellulose esters and ethers through the vinyls and vinyl copolymers. It is compatible with alkyds and some synthetic rubbers.

We shall be pleased to send complete data and samples for your experimentation. You may make your request on the convenient coupon, by contacting the nearest Monsanto office or by writing: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 So. Second St., St. Louis 4, Mo.

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CHEMICAL AND PHYSICAL PROPERTIES OF MONSANTO ORTHO-NITROBIPHENYL

The figures included are approximately correct and can be considered as average values for ortho-nitrobiphenyl, technical.

	Grade A	*Grade B*
COLOR AND APPEARANCE	Light greenish yellow crystalline solid or oily liquid.	Light to dark reddish brown crystalline solid or oily liquid.
MELTING POINT		35°C.
BOILING POINT AT 760 MM.		320–330°C.
REFRACTIVE INDEX AT 25°C.		1.613
SPECIFIC GRAVITY AT 40°/15.5°C.		1.189
SPECIFIC GRAVITY TEMPERATURE COEFFICIENT		0.00083/°C. (33°–80°C.)
VISCOSITY AT 25°C. AT 45°C.		38 Centipoises 12 Centipoises
FLASH POINT		143°C. (289.5°F.)
FIRE POINT		179°C. (354.5°F.)

SOLUBILITY: Ortho-Nitrobiphenyl is readily soluble in most organic solvents but is practically insoluble in water, either hot or cold. Some of the materials in which Ortho-Nitrobiphenyl will dissolve are:

Benzene	Ethyl Acetate	Mineral Spirits
Ethyl Alcohol	Amyl Acetate	Pine Oil
Methyl Alcohol	Ortho-Dichloro-benzene	Turpentine
Ether		Linseed Oil
Acetone	Carbon Tetrachloride	Soyabean Oil
Methyl Ethyl Ketone	Glacial Acetic Acid	Corn Oil

BETWEEN THE LINES

Farm Waste Research

Production of motor fuel from corn cobs and cottonseed hulls, myrcene and isoprene from turpentine, and a new high-tensile cotton tire cord, are some of the more promising projects in work at the Department of Agriculture as a part of its program of industrial utilization of farm wastes. About 100,000,000 tons of farm waste a year could be made available for industrial use.

THE possibilities of converting into valuable commodities such agricultural wastes as corn cobs, sugarcane bagasse, peanut shells, and other residue have a perpetual fascination. Besides the interest of the farmer in deriving profit from what is otherwise waste, the problem of wringing some utility from what would usually be cast off is an irresistible challenge to the researcher in science. The merging of these two incentives is found in the Bureau of Agricultural and Industrial Chemistry of the U. S. Department of Agriculture.

Currently, the Bureau has reported, a process for chemical conversion of such wastes as those above into liquid motor fuel and other commercially valuable products is moving into the semi-works stage.

Results of experimental laboratory investigations by Department chemists indicate that from 90 to 95 gallons of liquid motor fuel can be obtained from a ton of corn cobs or cottonseed hulls and that about half of this is in the form of ethyl alcohol. A continuous process for treatment, or saccharification, of corncobs and cottonseed hulls has been worked out, it is stated, by Drs. E. C. Lathrop and J. W. Dunning, of the department's Northern Regional Research Laboratory at Peoria, Ill.

These preliminaries gave such promising results that the work is now to be enlarged so that it may be tried out on a semi-commercial scale in a new building with modern equipment and staffed by approximately 15 of the best research men the department can find.

The plant is to be completed in 4 months, and large-scale research begun as soon as equipment can be installed, or about six months later. The Peoria laboratory was selected because the research facilities already include a large pilot plant for conversion of carbohydrates into liquid fuels and for testing motor fuels. The research will be closely integrated with other investigations already under way there.

This particular undertaking is part of the general program authorized by Congress in 1944 for large-scale research into production of synthetic liquid fuels from coal, oil shale, agricultural and forest products and other substances. The work on coal and oil shale, however, is under the Bureau of Mines in the Department of Interior. It will be recalled that these pages some time ago dealt with the relationship of the Interior and Agriculture departments on that particular project.

About 200,000,000 tons of farm wastes become available annually. A large part is plowed back into the soil, but about half of the total, it has been estimated, might be left for use in this or other new processes for transmuting into motor fuels. The first waste material to be tried on a large scale will be corn cobs, with research on other residues to come later as the work progresses.

The ground waste is first treated with an acid, producing concentrated solutions of dextrose and xylose, which are then fermented into alcohol, butanol and acetone. The new saccharification process gives relatively pure, separate solutions of 5-carbon and 6-carbon sugars. These solutions contain 10 to 15 per cent sugar. Furfural and lignin are obtained as by-products.

The new plant is capable of producing approximately 2,000 pounds of dextrose, 1,600 pounds of xylose, 1,000 pounds of lignin, and 200 pounds of furfural from 6,600 pounds of raw residue in an 8-hour operating period.

New Cotton Tire Cord

Obviously agricultural interests in Congress are very concerned with these and other developments in the same field. The above project is only one of more than a score on which work has been conducted the past year or is now in progress. In one instance the researchers have inadvertently found themselves in what may prove to be a very controversial issue, not of their choosing. This result follows development of a new processing method for producing a greatly improved cotton tire cord which compares so favorably with the high-tensile rayon product now in demand for synthetic tires as to have raised a question among Congressional investigators whether the Army's insistence on rayon would bear detailed examination.

Information Restricted

The complete results of the new process cotton tire cord are being covered by "military security" except to the extent that the Army has permitted certain information to be imparted to individual manufacturers. Members of Congress from cotton states have evinced a desire to go further into the situation, to determine if cotton cord might have been used to a greater extent. However, guarded statements of Agriculture experts indicated that rayon possessed certain inherent characteristics so that as one of them said, "rayon cord does perform well, but we think we have leads which will permit cotton cord to be manufactured that will perform equally well."

Cotton, it was recalled, based on certain experiments, tends to lose a larger percentage of its tensile strength when it attains 275° F., the figure at which tires fail because of rubber failure. However, it is claimed, cotton starts out with a higher tensile strength than rayon cord, so that if cotton is to compare with rayon in this use, it must be processed.

The Agriculture research men have endeavored to offset this deficiency in cotton cord by using certain special types of cotton and giving the cotton a mercerization treatment with alkali. It was found, they reported, that the loss of tensile strength in mercerized cotton cords is much less than that made from normal cotton. Arrangements were made with a large mercerization firm to treat enough of the selected cotton to make 600 pounds of cord, and further, with Rubber Research Corporation for manufacture of this cord into tires for testing on trucks. The degree of mercerization is being tested under close controls; as are also the various compounds in the tires for test.

One of the difficulties, well known in the synthetic tire field, is that heat builds up faster in synthetic rubber, which reacts unfavorably on the cotton cord in the tire. Tests have been under way at the New Orleans laboratory of the department, it is understood.

Stabilization of Nitrocellulose

Another field of research has dealt with stabilization of nitrocellulose derived from cotton, particularly when it is to be used for high explosives. In the production of pyronitrocellulose, it is recalled, most of the so-called stabilizers which are used require a considerable time, from 48 to 72 hours of treatment. It was found at the southern laboratory that the addition of a small amount of ammonia to the

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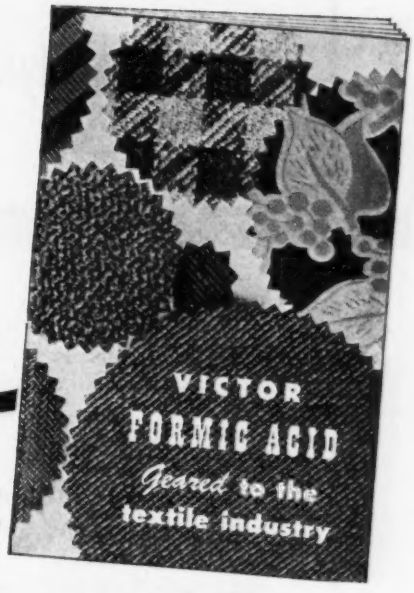

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Oxalates . . . calcium, sodium.

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In the **textile industry**, Victor Formic Acid is widely used as an acidulant in the dye bath . . . for wool, silk, cotton and other textiles. It is especially recommended where exhaustion of the dye bath is incomplete or where mineral acids are too strong for proper penetration and levelness. Since Victor Formic Acid is completely volatile it will not cause any decrease in the tensile strength of the fabric. For further details send for special booklet.

In the **tanning industry**, Formic Acid offers definite advantages in removing lime from the pores of bated hides. The grain side is generally cleaner, a more evenly colored leather results, and there is no unnecessary waste of hide substance.

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nitrocellulose suspension decreases the stabilizing treatment period to less than 24 hours and as low as 16 hours.

This idea has interested naval authorities to the extent that the laboratory of that service at the Indian Head, Md., station has treated several tons of pyro-nitrocellulose by this process on a pilot plant scale. It is believed the process may prove very useful, with obvious applications in large-scale production and storage.

Naval Stores Research

Other research by this group has continued in the chemistry and technology of naval stores production and utilization. Some processes developed by the bureau for cleaning gum are coming into increasing use by the naval stores industry, it is reported. Some seven licenses have been granted to processes for using this patent, and last year approximately 40,000,000 pounds of high-grade rosin and about 1½ million gallons of gum turpentine were produced under these licenses.

It may be recalled that this department has reported on experiments of inducing increased gum flow by chemical treatment of trees. The verdict as of now is that gum produced by chemical stimulation "is perfectly all right if processed properly."

In this general field, laboratory investigations are continuing on methods for producing myrcene and isoprene from turpentine. Myrcene has now been developed by the Agriculture research staff to a point where it may have application in the manufacture of certain types of synthetic rubbers. Union Bay State Chemical Co. of Boston is reported to have been experimenting on this material with some progress.

Referring again to the chemical stimulation of turpentine, some question has been raised as to whether quality of the gum is affected. On this point, an expert of the Agriculture Department's research staff has reported:

"If the rosin acids are subjected to heat in the presence of a mineral acid, they change their nature and crystallize easily. Such a rosin cannot be used in making up certain types of varnishes and gloss oils and makes difficult production of paper size.

"We feared that in this treatment with the mineral acid to stimulate the flow, that acid being washed down into the cup might do two things—deteriorate the cup, usually of metal, and then carry through into the still to yield a low quality rosin. We had to adapt a process of distillation in the washing of the gum to overcome this. Using our process, the industry can take advantage of this stimulation which should increase the production of gum by about 50 per cent. But without the improved distillation process this method of gum flow stimulation could not have been used."

NEW KNOWLEDGE CHALLENGES METALLURGISTS

The RCA Electron Microscope discloses significant aspects of metal structures previously unknown

THE accompanying illustrations with their captions are exciting examples of the greater insight into metal structures now made available by the RCA Electron Microscope.

These illustrations are reproductions from electron micrographs made with an RCA Electron Microscope in the Aluminum Research Laboratories of Aluminum Company of America, and are published here by courtesy of that company.

Aluminum Company of America is but one of many leaders in American industry and science that have purchased RCA Electron Microscopes for use in uncovering new knowledge. This knowledge is directly and profitably applied to improve processing procedures and control.

The RCA Electron Microscope is capable of direct magnifications up to 20,000 diameters. Sharp, clear micrographs can be easily and quickly produced. These micrographs are suitable for useful enlargement up to 100,000 diameters. RCA engineers, equipped to help you appraise the possibilities of this remarkable instrument, are at your service for consultation. Please address inquiries to Electron Microscope Section, Dept. 131 R. Radio Corporation of America, Camden, N. J.

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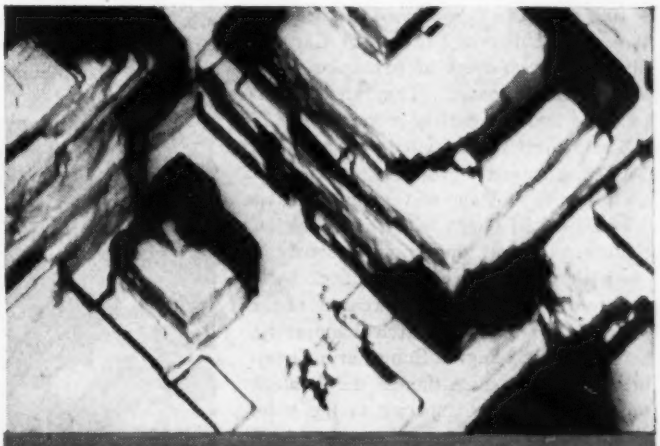
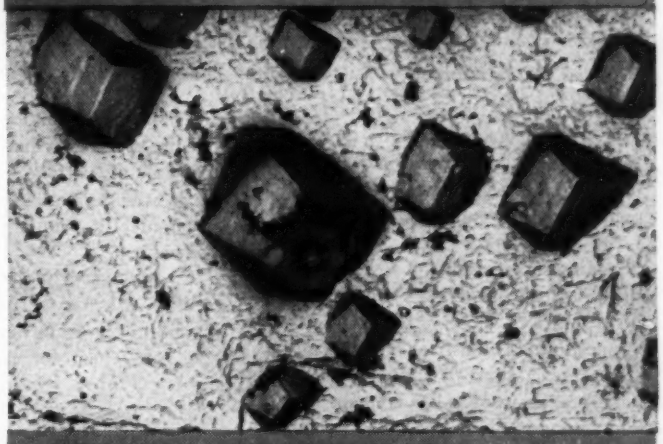


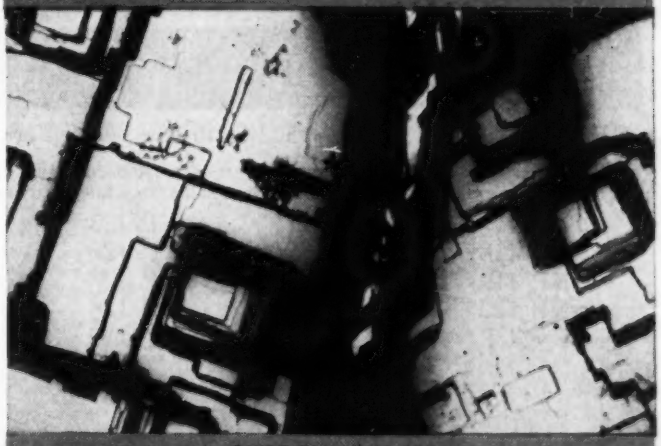
OXIDE FILM X 11,500

Cubic block structure within a single grain, in a deep-etched sample of an annealed aluminum alloy sheet.



OXIDE FILM X 5,000

Cubic etch pits, in a deep-etched sample of an annealed aluminum alloy sheet.



OXIDE FILM X 11,500

Cubic block structure adjacent to a grain boundary, in a deep-etched sample of an annealed aluminum alloy sheet.

NEW PRODUCTS & PROCESSES

Tannin Sources Discovered NP 117

In a study of 199 species of southeastern trees, the University of North Carolina discovered two trees of particular value as a source of tannin. They are the buttonwood and the darling-plum.

The project was initiated by Dr. Alfred Russell, chemistry professor, in view of the ultimate shortage of vegetable tans as a result of the blight which is killing off the chestnut trees, our principal source.

Another source, western hemlock bark, was reported on by T. L. Swenson, of the Western Regional Research Laboratory, before the Washington State Farm Chemurgic Committee. Although the hemlock tan is equal if not superior to the more usual materials, it has not heretofore been possible to produce it economically. It was suggested that modern hydraulic barking methods might make economic production feasible.

Liquid Insulation NP 118

A new liquid insulation product, PiB, has now been made available to the general public by U. S. Industrial Chemicals, Inc. At present it is widely used in jeeps, trucks, tractors and amphibious vehicles of the armed forces.

Civilian application of the compound will be extended to the passenger car, bus and truck fleet, factory, farm and marine engine fields. Industrial motors in factories, power plant dynamos, farm equipment such as tractors, sawing machinery, sump pumps, oil burners, boat and ship motors are some of the potential types of equipment which may be treated with the new liquid insulation.

Used as a water-proofing agent on ignition systems and to prevent corrosion and current leakage in batteries, PiB also may be used to re-insulate cracked, worn, or dried-out wiring, and in addition acts as a rust inhibitor.

Applied with either a brush or spray to wire coils, distributors, sparkplugs and the top of battery carriers, the liquid penetrates rather than coats and is highly resistant to ordinary acids, oils and greases.

An electrical motor which has been treated with the material, and which was placed under water two years ago, still operates when current is switched on.

Acetonylacetone NP 119

The commercial availability of acetonylacetone, or hexanedione-1,2, has been announced by Carbide and Carbon Chemicals Corp., which has prepared a technical information sheet listing its properties and uses.

The compound is relatively involatile, boiling at 192 deg. C., completely miscible with water and alcohol, but immiscible with hydrocarbons. It has many desirable solvent properties; and as a high-boiling solvent in cellulose nitrate and "Vinylite" resin lacquers, this ketone permits the formulation of unusually high-solids vehicles with workable viscosities. It is also a good high-boiling solvent for acetylene.

The most remarkable chemical property of acetonylacetone is the ease with which it reacts to form five-membered heterocyclic compounds, such as dimethylfurane, dimethylthiophene, dimethylpyrrole, and their derivatives. It is said to react with certain aldehydes to form thermosetting resins.

A new technical information sheet on the properties and uses of another ketone, isophorene, has also been made available by Carbide and Carbon.

Rosin Soap Rubber NP 120

Production figures were released today by the B. F. Goodrich Co. on a new, improved type of synthetic rubber for tires which uses for emulsion a soap solution with a base of rosin acid.

A plant at Louisville has manufactured 10,000 tons of this special variant of GR-S rubber since last June and is now producing at the rate of 15,000 tons a year, and a 15,000-ton a year production line has just been established in a plant built and operated for the government at Port Neches, Texas.

Named GR-S-10 and sometimes called rosin soap rubber, this special product is said to have properties which reduce tread cracking and increase road wear. It is a butadiene-styrene copolymer.

Allylic Halides NP 121

Several new allylic chlorides and polychlorides are now available from Halogen & Perfume Chemicals.

1,2 - Dichloro - 2 - propene, $CH_2{:}CCl\text{-}CH_2Cl$, and hexachloropropene, $CCl_2{:}CCl\text{-}CCl_3$, are of interest for addition, alkylation, aluminum chloride, and metathetical reactions. The allylic chlorine atoms are easily replaced.

Asym - Heptachloropropane, $CHCl_2\text{-}CCl_2\text{-}CCl_3$; 1,1,2,3-tetrachloro-2-methylpropane, $CH_2Cl\text{-}C(CH_3)Cl\text{-}CHCl_2$; and 2,2,3-trichlorobutane, $CH_3\text{-}CHCl\text{-}CCl_2\text{-}CH_3$, are offered as intermediates for dehydrohalogenation and aluminum chloride reactions as well as for solvent and other experimental work.

Organic Carbonates NP 122

Three new organic carbonates are being offered by the Columbia Chemicals Division of Pittsburgh Plate Glass Company. They are, butyl diglycol carbonate, bu-

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Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 117	NP 121	NP 125	NP 130
NP 118	NP 122	NP 126	NP 131
NP 119	NP 123	NP 127	NP 132
NP 120	NP 124	NP 128	NP 133
		NP 129	NP 134

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toxethyl diglycol carbonate, and phenyl diglycol carbonate.

They are substantially insoluble in water and are very stable to hydrolysis by water. They can yield only neutral products and carbon dioxide upon hydrolysis.

The new compounds are widely soluble in organic solvents and are compatible with many resins and plastics. The properties of these ether-esters suggest that they might be used to advantage as plasticizers, high-boiling solvents, and softening agents as well as in pharmaceutical and lubricant compositions.

Electrolytic Tin Plating Improved NP 122

New advantages have been brought to electrolytic tin plating by the Metal & Thermit research laboratory as a result of their discovery that potassium stannate in the electroplating bath is superior in many respects to the commonly used sodium stannate. Potassium stannate has four definite advantages over sodium stannate. First: the higher solubility of this new chemical permits the use of more concentrated plating baths, especially at higher temperatures. Second: Because of its greater conductivity, less voltage is required and anodes may be kept farther away from the work during plating. Third: The added stability of potassium stannate solutions allows the continued use of more concentrated solutions without sludging trouble. And finally, the greater cathode efficiency shows an increase of 18% in deposition rate at currents normally employed with sodium solutions. All of these factors combine to provide a plating solution which permits the continued use of plating speeds of from six to twelve mils per hour, representing a 100% to 400% increase over those possible with regular sodium stannate baths.

Magnesium Bisulfite For Pulp Process NP 123

American paper mills, using the sulfite pulping process to manufacture paper pulp, lose 10,000 tons per day of recoverable lignins, carbohydrates and the chemicals employed in the extraction or cooking operation. In addition, this "waste," which is pumped out from the paper mills in liquid form to adjoining streams, pollutes the waters, killing off fish and plant life.

An answer to the problem may be found in a change in the chemical used in the acid process from a calcium base to a magnesium base, a process developed jointly by The Howard Smith Paper Mills, Montreal, Canada, and The Babcock and Wilcox Company, New York; and independently by the Weyerhaeuser Timber Company, Longview, Washington.

When magnesium bisulfite is employed as the cooking liquor, the liquor can be satisfactorily evaporated without scale formation, the chemicals recovered and recycled, and the heat from the combustion of the lignins and carbohydrates used for the efficient generation of steam.

While only a small percentage of material now wasted can be used for commercially saleable items, such as vanillin, alcohol, yeast, oxalic acid, road binders, cements and lignin plastics, there still remains the problem of the economic disposal of the balance. The waste products might be rendered non-toxic so that fish and marine vegetation would be uninjured, but this would constitute an additional cost against every ton of pulp produced by a mill, and therefore would be a definite economic disadvantage in the highly competitive pulp industry.

Following laboratory and experimental investigations, made by the Howard Smith Paper Mills and The Babcock and Wilcox Company, a semi-commercial pilot plant incorporating the magnesium base operation, was installed at the Cornwall, Ontario, Division of The Howard Smith Paper Mills, Ltd., and operated for a sufficient period of time to prove conclusively the practicability and economics of the process. Further commercial installations of the process have been held up by the war.

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PAROIL 143 is a chlorinated paraffin wax containing about 43% combined chlorine. It is a honey colored non-volatile liquid, soluble in most organic solvents, including hydrocarbons, but insoluble in water. PAROIL 143 is compatible with most resins, plastics and synthetic rubbers, with the exception of the cellulose derivatives.

PAROIL 143 is widely employed as a plasticizer in protective coatings, inks, plastics, synthetic rubbers and coated fabrics. It also finds use in fire retardant compositions, as an additive in lubricants and as a chemical intermediate.

Write for a sample and further information.

AMECCO CHEMICALS INC.

NEW YORK SALES OFFICE • MAIN OFFICE AND PLANT

60 EAST 42nd STREET, NEW YORK 17, N.Y. 75 ROCKWOOD STREET, ROCHESTER 10, N.Y.

ESTABLISHED 1919

Fluorescent Cleanser NP 124

A product developed recently to meet cleaning problems is Maintenex, created by the research laboratories of the A. C. Horn Company. The distinctive feature of Maintenex is the fact that while going into solution rapidly it produces a fluorescent color. This color serves as the indicator of the correct dosage of cleanser. Overdosing or waste is therefore minimized. The usual ratio is one ounce per gallon of water, but all measuring or weighing is unnecessary, thanks to the color saturation signal incorporated in Maintenex.

Maintenex is free of abrasives or filler, and emulsifies dirt and soil rapidly so that it can be rinsed away without redeposit.

Weed Killer NP 125

A new selective weed killer of the plant hormone type, claimed to be superior to 2,4-dichlorophenoxyacetic acid, has been reported by Imperial Chemical Industries, Ltd.

Given the name "Methoxone," it is 2-methyl-4-chlorophenoxyacetic acid. It is said to be superior to the dichloro-compound in that the latter is less selective and therefore more likely to harm crops.

Extensive field tests have been carried out by the manufacturer in collaboration with the Ministry of Agriculture.

UNIFORMITY

Measured By Meeting Predetermined Standards

Set rigid specifications and strict limits on impurities for product after product . . . then make these your inflexible standards for lot after lot—and you have the *true measure of uniformity for laboratory reagents.*

Exacting and difficult to achieve, particularly under present conditions? Yes, but to assure uniformity that is the code by which Baker & Adamson produces its reagents. *Every time* a B&A Reagent is manufactured it *must conform to predetermined, exacting specifications,* for B&A is not satisfied merely to determine and accept after production whatever quality results. Such insistence on uniformity is reflected by the labels on every lot of any B&A Reagent—there is no variation here, for the standards are always met.

And to give you the finest in laboratory reagents, B&A continues to establish new, higher levels of chemical quality—to set closer tolerances on impurities for its products to meet—even under today's trying times.

For good reason, then, Baker & Adamson uniformity has earned the confidence of chemists everywhere. That's why so many always specify B&A as their choice!

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Announcing NEUTROSCENTS

. . . . A new group of aromatic compounds designed to accomplish these two results:

1. NEUTRALIZE OFFENSIVE ODORS and
2. SUBSTITUTE REFRESHING SCENTS

NEUTROSCENTS have a wide range of usefulness, both as deodorants and re-odorants or fresheners for contaminated atmosphere. Such applications would include use in hospitals, sick rooms, theatres, smoking rooms, kitchens, restaurants, convention halls, institutions, refuse disposal plants, janitor's supplies and countless others.

NEUTROSCENTS are adaptable to every practical method of dispersion, i.e., by simple open receptacles, by spraying devices, by aerating and air conditioning units and other dispersion and evaporation devices.

NEUTROSCENTS are now available in TEN appealing odors, each in THREE different forms (Concentrated, Water Soluble and Solubilized) thus providing a wide and varied selection of odorizing compounds for the prospective user. If interested in some specific use, either for immediate or post-war development, write us for suggestions, samples and other details.

FRITZSCHE BROTHERS, Inc.

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FACTORIES AT CLIFTON, N. J. AND SEILLANS (VAR) FRANCE

Synthetic Estrogens NP 126

Development of a new chemical, benzestrol, highly effective as a female sex hormone but largely free of ill effects and inexpensive to make has been described by Ralph C. Tallman, former research director, Alfred H. Stuart, and Anthony J. Shukis, of Schieffelin and Company, New York.

The natural estrogenic hormones have long been isolated, and some simpler, cheaper compounds have been developed which possess the same sort of hormone activity. They are important clinically, notably for relieving the tensions and disturbances of the menopause, but the best of such synthetics had the drawback of inducing gastric disturbances.

Benzestrol, already in clinical use, differs from all other synthetic estrogens in that its basic structure is diphenyl propane.

The synthesis is begun with anisaldehyde and *p*-methoxybutyrophenone, which are condensed to give a chalcone. Ethyl magnesium bromide adds 1,4 to the conjugated system. The resulting ketone is again treated with a Grignard reagent—this time methyl magnesium bromide. The resulting carbinol is dehydrated and hydrogenated, and the methoxyl groups on the rings are demethylated to phenolic hydroxyl groups. The final compound is 1,3-bis-(*p*-hydroxyphenyl)1,2-diethyl-3-methylpropane, one of the four racemic mixtures of which is benzestrol.

Insulating Resin NP 127

Monsanto Chemical Company has begun volume production of Styramic HT, a new thermoplastic with electrical insulating properties.

Styramic HT's most significant characteristic is the combination of heat resistance with high insulating efficiency in uses such as radar, television and facsimile transmission. In these, Styramic HT seems likely to find its greatest utility.

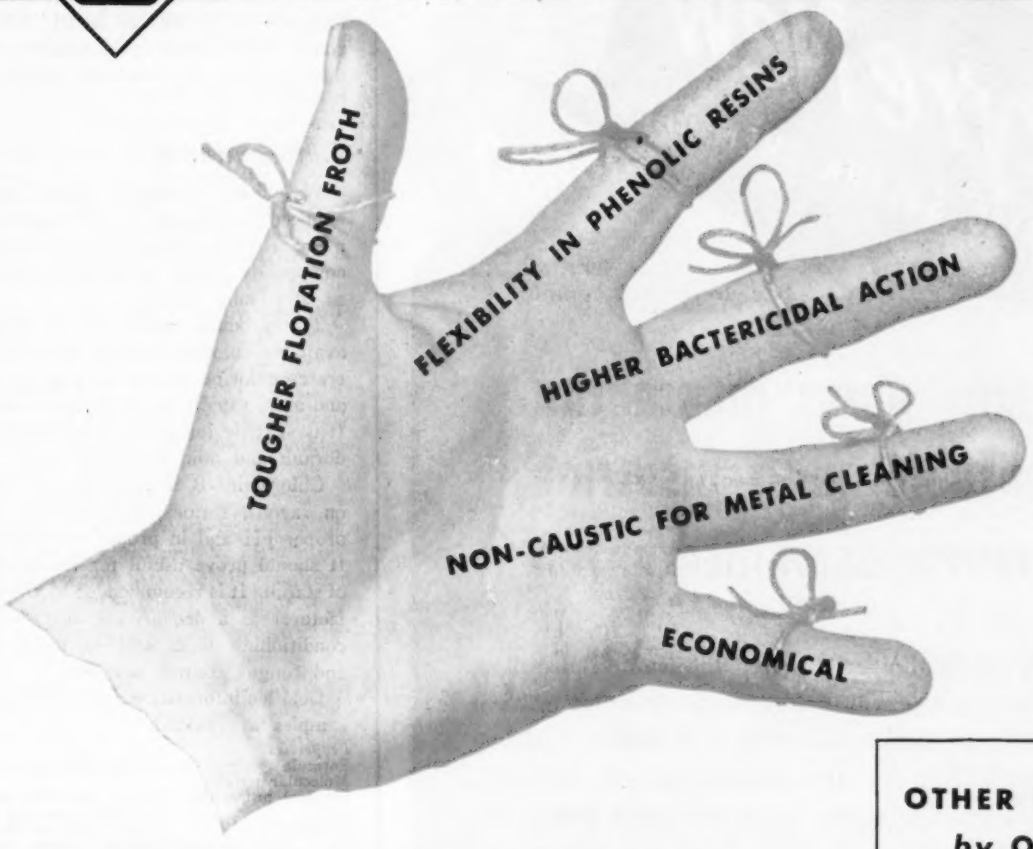
Electronic researchers have long had at their command a rigid plastic insulating material with conductivity characteristics approaching those of Styramic HT. Yet this material starts to lose its shape at 168° F., whereas Styramic HT has a heat distortion point of 236°. Certain ceramics and glasses, ideal as insulators, cannot be precision-molded or machined.

Styramic HT is being produced in a new plant, designed by Monsanto engineers for the Defense Plant Corporation, which adjoins Monsanto's Plastics Division properties at Springfield, Mass. It is being operated by Monsanto.

As has been the case since production of Styramic HT was started in pilot plant quantities, the entire output will go to meet highly classified military requirements until these needs cease to exist. There is little likelihood that even small quantities can be immediately distributed

ORONITE CHEMICALS

THE NAME TO WATCH IN CHEMICALS



REMEMBER THESE 5 REASONS WHY YOU SHOULD SPECIFY ORONITE CRESYLIC ACIDS

Oronite Cresylic Acids* (from petroleum) offer the user several advantages over those of coal tar derivation. To mention a few: (1) They produce tougher froth in flotation processes; (2) They have greater flexibility in phenolic resins; (3) Have higher bactericidal action in disinfectants; (4) They are valuable for thorough, non-caustic metal cleaning; (5) They are economical for use in plasticizers, anti-oxidants, lubricant additives, etc.

The wide variety of grades of Oronite Cresylic Acids makes it possible for the user to find practically any combination of properties which may be required. The lighter grades are composed mainly of cresols and xylenols with only small amounts of phenol, while the heavier grades contain large amounts of higher alkyl phenols with only small proportions of cresols and xylenols.

To make practical use of, or to determine possible uses of Oronite Cresylic Acids, the industrial chemist must have complete, specific data regarding their properties. Oronite has available a comprehensive brochure which will be sent to those who desire it.

Oronite Cresylics Are Available On Priority Only

*TRADE MARK REG. U. S. PAT. OFF. 1937

OTHER PRODUCTS by ORONITE

Oronite Naphthenic Acids are available in many grades for use in the manufacture of detergents, greases, water soluble oils and wood preservatives, and as flotation agents.

Oronite Wetting Agent is a semi-fluid material valuable in both acid and alkaline solutions.

Oronite Aliphatic Acids have valuable froth control properties in the flotation treatment of many types of ores.

Oronite Polybutenes are relatively high molecular weight co-polymers of straight and branched chain olefinic pure hydrocarbons. They serve many special manufacturing and industrial purposes.

Oronite Sodium Sulfonates are available in several grades to serve your specialized requirements.

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Phillips CHEMICALS

They're New

ALIPHATIC SULFUR CHEMICALS

TERTIARY BUTYL MERCAPTAN

DI-TERTIARY BUTYL DISULFIDE

TERTIARY DODECYL MERCAPTAN

Yes, there IS something new under the sun. These new petroleum chemicals, never before made in volume, have properties which are sure to lead to a wide variety of industrial applications. They are manufactured in tank car quantities. Six more Phillips sulfur chemicals listed below are available now in drum quantities. . .

TERTIARY AMYL MERCAPTAN
TERTIARY HEXYL MERCAPTAN
TERTIARY HEPTYL MERCAPTAN
TERTIARY OCTYL MERCAPTAN
TERTIARY TETRADECYL MERCAPTAN
TERTIARY HEXADECYL MERCAPTAN

NOTE

We'll gladly mail you a copy of bulletin #118, listing physical properties, typical reactions, and suggested uses of these compounds. Experimental sample requests on company letterhead will receive prompt attention.

PHILLIPS PETROLEUM COMPANY

Special Products Division

DRAWER Y BARTLESVILLE, OKLAHOMA

to plastics manufacturers for evaluation in other than war products.

Styramic HT, with low yields from base materials and with its complexity of manufacture, cannot at present be projected as a product likely to achieve low cost in the immediate postwar era. Indications are it will go largely into specialty uses where performance rather than price is the dominant factor.

Chloramine-B NP 128

Wyandotte Chemicals Corp. has announced production of chloramine-B, a member of a group of active-chlorine compounds which have found wide use as sterilizing agents.

The product, which has a minimum available chlorine content of 27.6%, liberates chlorine slowly in water solution and more rapidly in the presence of acids. It is suitable for use as a germicide, deodorant, and mild bleaching agent.

Chloramine-B is reported safe for use on rayons, cottons, and woollens at the proper pH and in proper concentrations. It should prove useful for the modifying of starch. It is recommended by the manufacturer as a deodorizing agent for air-conditioning units and in mold, slime, and fungus control problems.

Detailed information and complimentary samples are available.

Properties	
Formula	$C_6H_5SO_2NClNa \cdot 1\frac{1}{2}H_2O$
Molecular weight	240.6
Physical properties	White plate-like crystals with faint chlorous odor
Solubility	Water . . 20% at 20 deg. C Alcohol . . . . . sol. with dec. Acetone . . . . . sol. with dec. Insoluble in ether, benzene, carbon tetrachloride, and most non-polar solvents.
Stability	Very stable at room temperature
Compatibility	Compatible with most neutral and alkaline salts, both dry and in water solution. Incompatible with acidic substances, ammonia, ammonium salts and reducing substances.

Coking Coal NP 129

As a contribution toward relieving the wartime shortage of certain special coals and to produce enough coke to keep steel furnaces operating at capacity, several by-product coke plants now are mixing fine anthracite with bituminous coal to manufacture coke, and several other plants are conducting experiments in this field, according to a report by the Bureau of Mines.

Nine of the plants surveyed are using anthracite "fines" in regular plant operations to produce blast furnace coke and foundry coke, the report shows. At seven other plants, only ovenscale tests had been made, some tests indicating that more extensive investigations were justified and others being inconclusive. At another plant, full-scale tests proved satisfactory. At the remaining four plants it was found that anthracite would be detrimental to their operations.

Viewing with encouragement the re-

sults obtained so far in substituting anthracite for bituminous in producing coke, the Bureau's report recommends a continuance of the practice and of the tests, but advises industry that "it is apparent that the use of anthracite fines is an individual plant problem" to be worked out with due regard for the variance in conditions and types of coal—both anthracite and bituminous.

The shortage of low-volatile coking coal and a surplus of anthracite "fines" are factors favorable to the manufacture of byproduct coke of this type, the report explains, adding that "replacing 3 to 5 percent of . . . coal with the same proportion of anthracite fines in the coal mixtures used in the manufacture of byproduct coke will alleviate both of these conditions."

Vitamin D_2 NP 130

Pure synthetic vitamin D_2 (calciferol) has been made available by Winthrop Chemical Company, Inc.

Free from lumisterol, toxisterol, suprasterol and other byproducts of irradiation, the product is said never to vary in antirachitic potency. It will be marketed by the Special Markets Division of Winthrop to the pharmaceutical industry, the evaporated milk industry and others.

Crystalline calciferol will be available as will a solution in corn oil.

Winthrop also announced the availability of *dl*-Valine, the fourth synthetic amino acid in its line. Others introduced in recent months are *dl*-tryptophane, *dl*-phenylalanine, and *dl*-methionine. *dl*-Valine is priced at $210 per kilo, or $25 per 100 grams.

Mildewproofing Agent NP 131

An organo-mercuric compound patented by the Sowa Chemical Co. is said to impart bacteriostatic and fungistatic properties to textiles, paper, leather, etc., in very low concentrations. The compound is stable and does not react adversely with the treated material. Essentially a mercurated benzyldimethylamine, it is 2-hydroxy-3-dimethylaminomethyl-5-amyl-phenyl mercuri-acetate.

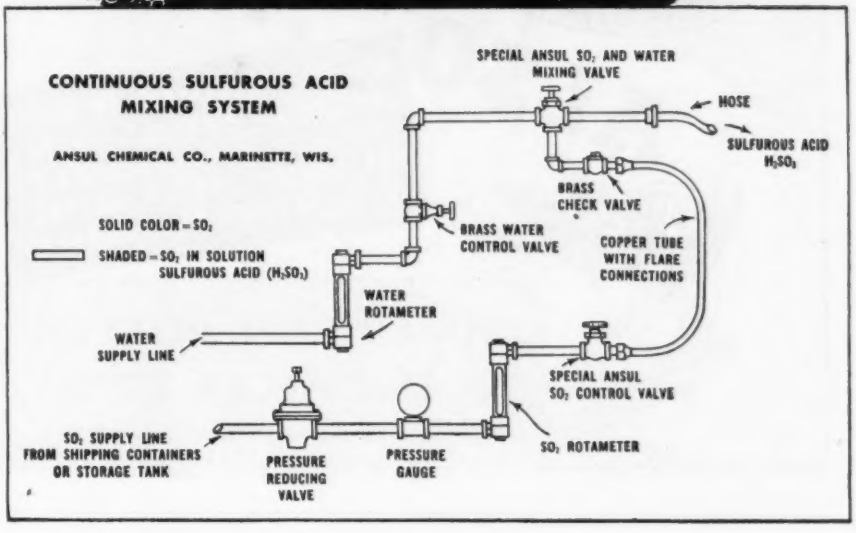
Solvent-Free Emulsion Adhesive NP 132

The "Resyn" Division of National Adhesives has developed a solvent-free synthetic resin emulsion for adhering labels to "V" board, wood, and black or galvanized iron, which also serves as a waterproof label overcoating. This product, in addition, has been found to adhere export labels firmly to synthetic rubber tires.

The adhesive is supplied in cold liquid form and can be diluted with water. When used as an overcoating, the emulsion "breaks" immediately, depositing a waterproof, transparent resin film on the surface. It neither clouds nor smears printing inks and is highly resistant to abrasion.

National's new adhesive can be applied

A SIMPLE WAY TO MAINTAIN A Constant SO_2 Concentration DEVELOPED BY ANSUL TECHNICAL STAFF


CONTINUOUS SULFUROUS ACID MIXING SYSTEM
ANSUL CHEMICAL CO., MARINETTE, WIS.
SOLID COLOR = SO2
SHADED = SO2 IN SOLUTION SULFUROUS ACID (H2SO3)
SPECIAL ANSUL SO2 AND WATER MIXING VALVE
HOSE
SULFUROUS ACID H2SO3
BRASS CHECK VALVE
BRASS WATER CONTROL VALVE
COPPER TUBE WITH FLARE CONNECTIONS
WATER ROTAMETER
WATER SUPPLY LINE
SPECIAL ANSUL SO2 CONTROL VALVE
SO2 SUPPLY LINE FROM SHIPPING CONTAINERS OR STORAGE TANK
PRESSURE REDUCING VALVE
PRESSURE GAUGE
SO2 ROTAMETER

● Pre-mixing of water and liquid SO_2 . . . accomplished through the use of meters and a single, Ansul-designed valve installed at the juncture of the water and SO_2 supply lines . . . . permits constant control of the H_2SO_3 at any desired concentration.

If you have need for an SO_2 mixing system for a specific application in your business, Ansul technicians will plan one for you.

LIQUID Sulfur Dioxide ANSUL*

PHYSICAL PROPERTIES

Chemical formula	SO_2
Molecular weight	64.06
Color (gas and liquid)	Colorless
Odor	Characteristic, pungent
Melting point	−103.9° F. (−75.5° C.)
Boiling point	14.0° F. (−10.0° C.)
Density of liquid at 80° F.	(85.03 lbs. per cu. ft.)
Specific gravity at 80° F.	1.363
Density of gas at 0° C. and 760 mm.	2.9267 grams per liter (0.1827 lb. per cu. ft.)
Critical temperature	314.82° F. (157.12° C.)
Critical pressure	1141.5 lbs. per sq. in. abs.
Solubility	Soluble in water
Purity	99.9+% (by wt.) SO_2 (H_2O less than 0.01%)

*REG. U. S. PAT. OFF.

Send for your copy of "Liquid Sulfur Dioxide"—a treatise on the properties, characteristics, and industrial uses of Liquid Sulfur Dioxide—written by the Ansul Technical Staff.

ANSUL CHEMICAL COMPANY • MARINETTE, WISCONSIN
EASTERN OFFICE: PAOLI, PENNA.

by brush or gumming machine, is very fast setting and dries tack-free—even under high humidity conditions. It is identified as Resyn Adhesive Q3605 and is currently priced in drums at 22¢ per lb. f. o. b. New York or Chicago.

This product complies with current Government specifications (such as AXS-1472) calling for the application of shipping and identification labels to various types of containers with a water resistant adhesive and overcoating them with a waterproof material. Heretofore, only lacquer-type adhesives were approved for this requirement.

Halogenated Phthalic Anhydride Offered NP 133

A new industrial chemical, tetrachlorophthalic anhydride, is announced by the Niagara Alkali Company, under the trade name of "Niathal." It is suggested for use as an intermediate or compounding material in the manufacture of dyes, pharmaceuticals, fungicides, esters, plasticizers, protective coatings, synthetic resins, synthetic rubbers, insulating materials, and lubricants.

Niathal is a white, odorless powder with a purity greater than 99%. It is free-flowing and non-hygroscopic and melts at 254-255° C. It has an appreciable vapor pressure only at elevated temperatures. The boiling point is 362° C. Experience indicates that it is non-irritating and non-toxic, but suitable precautions are recommended in making new compounds and products.

The stability and the high melting point suggest that products made from Niathal may be used at more elevated temperatures than those from phthalic anhydride. The high chlorine content also improves resistance to fire.

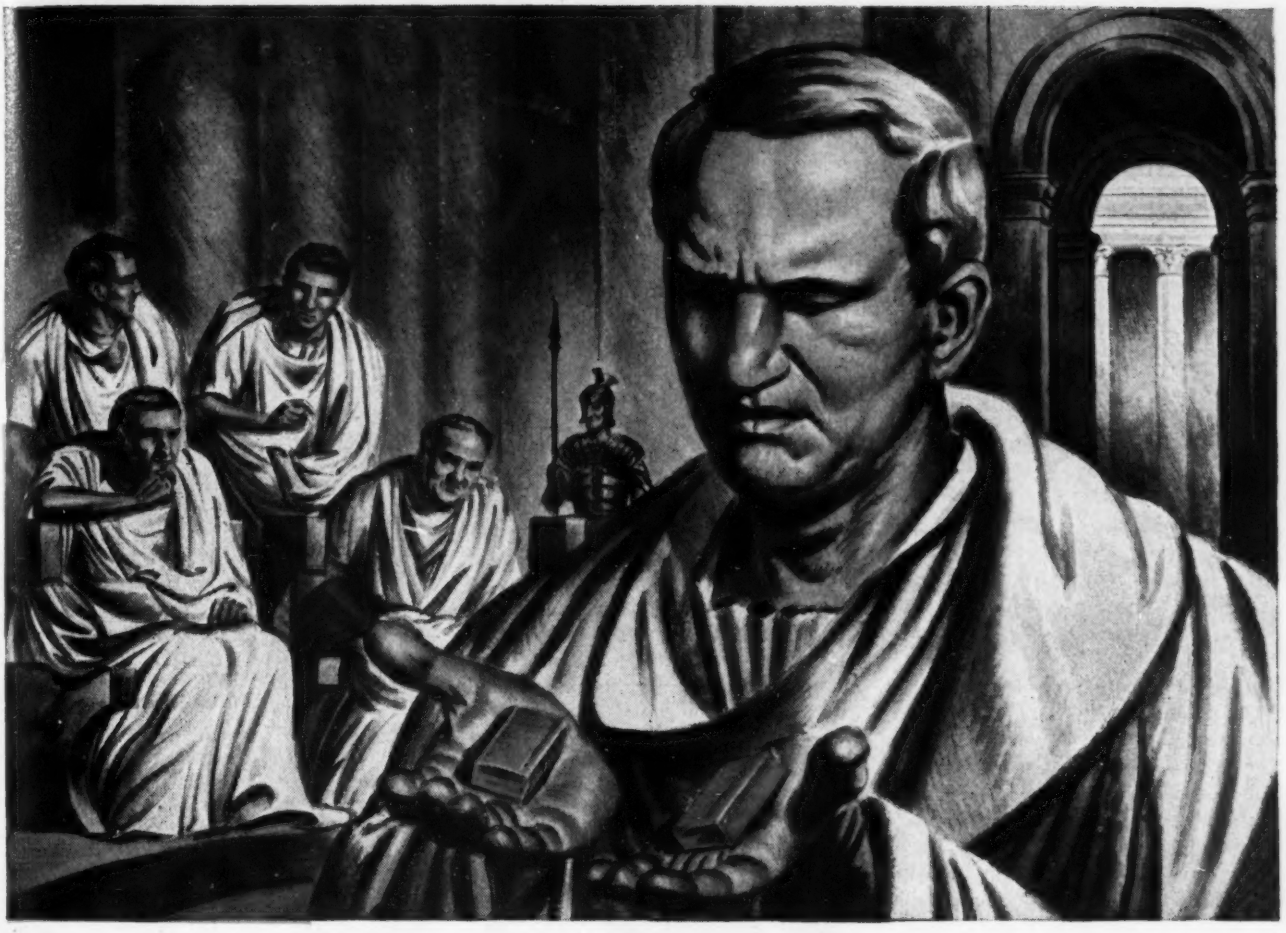
At the present time Niathal is available only in experimental quantities due to the restrictions in the supply of the raw materials.

Color Glue For Plastics NP 134

The Krieger Color & Chemical Company announces the recent commercial development of a new important material called "Krieger-O-Dip Color Glue." This new product is used with excellent results where laminating or bonding plastics and color together is desired.

Color glue can be used in painting the surface of Lucite, Plexiglas, and cellulose acetate. It is also used where a simulated "shell effect" is desired. The brown color glue can be painted over the surface of the plastic giving more pressure in certain areas and less in others. The glue dries in seconds, thus making its use speedy and most effective.

This new color glue can be obtained in red, blue, yellow, orange, brown, black and green. All these colors are intermixable, enabling the user to obtain an unlimited number of colors and shades.



Cicero's dilemma

BECAUSE "orichalcum" was indistinguishable from gold, Cicero raised this question of ethics: If a man thinks he is selling "orichalcum"—but is actually selling gold—is the purchaser morally obligated to point out the error?

The only metal which the Romans could have mistaken for gold was brass, the alloy of copper and the then little understood element—zinc.

Although the Romans knew nothing of the elemental nature of zinc, it is surprising that sixteen centuries later chemists still confused zinc with other metals. Albertus Magnus thought that zinc was a compound of iron; Paracelsus held that it was a form of copper; and as late as 1597, Libavius described it as a peculiar kind of tin!

Modern research has shown that zinc is monatomic. It fuses at 419°C. and, under ordinary atmospheric pressure, boils at 907°C. On cooling, the molten metal deposits hexagonal crystals and freezes into a compact crystalline solid.

Since 1867, MALLINCKRODT has specialized in the development and production of zinc compounds to be used in medicine and industry. For zinc products of dependable uniformity and purity, specify **MALLINCKRODT Zinc Acetate, Bromide, Carbonate, Chloride, Oxide, Stearate, Sulfate, etc.**

MALLINCKRODT CHEMICAL WORKS

FINE CHEMICALS Mallinckrodt SINCE 1867

FOR VICTORY BUY UNITED STATES WAR BONDS STAMPS

78 Years of Service to Chemical Users

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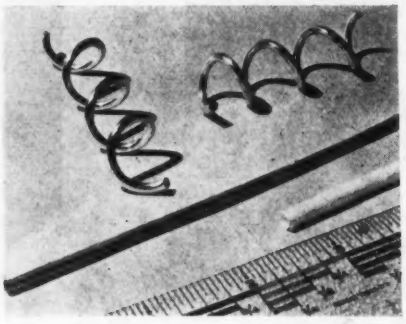
NEW EQUIPMENT

Thin-Wall Tubing QC 574

Seamless tubing of diameters down to 0.02″ I. D. with wall thicknesses of only 0.0001″ to 0.001″ have been produced by the Wire Division of the North American Philips Co. The tubing is completely



nonpermeable and is very uniform in wall thickness. It can be made of gold, silver, copper, nickel, and chromium and can also be prepared in such shapes as coils. However, coils must be originally formed in this manner and not shaped from a straight tube.

It is said to be of value in precision instruments as a substitute for a solid rod where feather-weight and strength are required. Other possible fields of application are yet unexplored, although it has been suggested that the new tubing may find use in high frequency radio circuits, and possibly by the medical profession.

White Prints QC 575

To provide efficient printing and developing facilities for those who require black and white prints in medium quantities, a new BW printing and developing machine, known as the Model 41, has just been announced by the Charles Bruning Co.

The Model 41 Printer, which combines individual printing and developing units in an all steel cabinet, has a printing speed range up to 6 feet per minute, depending on the transparency of the original, printing either roll stock or cut sheets, with a printing width of 46 inches. The light source is a 2000 watt mercury vapor lamp within a 6-inch diameter cylinder, assuring uniform distribution of light. Uniform cylinder temperature is maintained by a new method of cooling, thus assuring uniformity of print exposure. Air is also sucked in at the front of the machine to provide greater comfort for the operator.

Printing speed is controlled by a single knob within convenient reach of the operator. Suction through the bands simplifies feeding of tracings and sensitized paper and the tangential method of feeding eliminates pinching or catching. Tracings and prints are removed without scraping, insuring long cylinder life. A

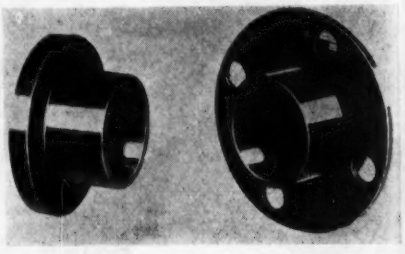
front pedal, at floor level and at the center of machine, instantly releases band tension so that mis-feeding of roll stock can readily be corrected.

Easily lubricated anti-friction bearings are used throughout. The ball bearing motors require no lubrication and the cylinder is easily accessible for cleaning. All wiring conforms to safety standards.

In the developing unit, speed in excess of maximum printer speed assures an uninterrupted flow of prints, which are delivered at front of the machine within easy reach of the operator. A new type ironing roll results in flat, dry prints.

Pipe Joint-Flange QC 576

A plastic (Van Stone Type) joint-flange is now available from the Commercial Plastics Company. The joint-flange consists of a flanged endpiece which



is heat welded on to the plastic pipe line, and a steel ring for bolting onto a similar joint flange to which the end is to be connected. This joint-flange is now available in sizes to fit pipe up to 4″.

Relief Valve QC 577

The Farris Engineering Company has perfected a relief valve, originally designed and used for marine services such as salt-water lines, fresh-water lines and equipment, and with special construction for lube oil lines, these relief valves have recently been adapted to widespread operations in industrial plants.

This Farris Relief Valve, Type 1000, is of unique construction, since the diaphragm acts in several capacities. The diaphragm seals this valve from leakage encountered around the stem in the conventional design. Therefore, it is highly acceptable for relief service where there

is fluid constantly on the downstream side. Another advantage is the fact that this valve will open to the full relieving capacity at 20% overpressure, rather than

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (7-5)

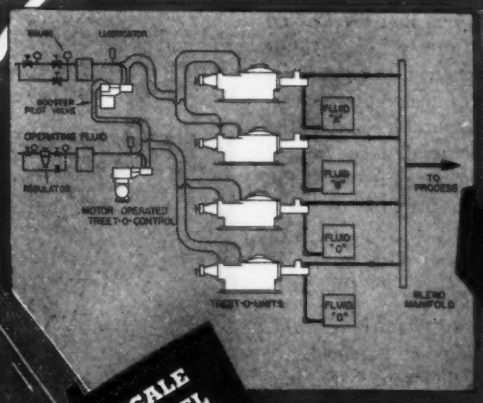
Please send me more detailed information on the following new equipment.

QC 574	QC 580	QC 586	QC 593
QC 575	QC 581	QC 587	QC 594
QC 576	QC 582	QC 588	QC 595
QC 577	QC 583	QC 589	QC 596
QC 578	QC 584	QC 590	QC 597
QC 579	QC 585	QC 591	QC 598
		QC 592	QC 599

Name ..... (Position) .....
Company .....
Street .....
City & State .....

A Working PRINCIPLE

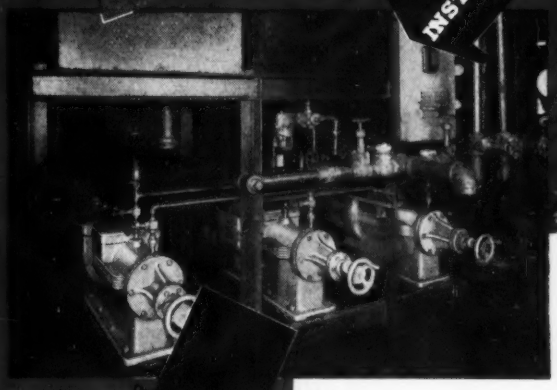
Continuous proportioning or batch blending of liquid components under line pressure



FLOW DIAGRAM

SCALE MODEL

PLANT INSTALLATION



FOR *Continuous Blending* OR "BATCHING" OF MULTIPLE FLUIDS

In pilot plant and full scale operations, accurate proportional blending of multiple streams in varying percentage relationships is often a requirement. The diagram and photographs above illustrate a simple yet infinitely flexible method which permits adjustments in formula while the equipment is in motion and at the same time, also, a change in the total rate at which the blend is being delivered, without affecting the proportions previously set.

If you have a proportioning problem, write for Bulletin 1700 or address our nearest office; our representative will gladly discuss your requirements.

Continuous BLENDING OR "BATCHING" WILL WORK FOR *You*

% PROPORTIONEERS, INC. %

WRITE TO % PROPORTIONEERS, INC.%, 10 CODDING ST., PROVIDENCE 1, RHODE ISLAND

the approximate 35% in the conventional type of relief valve which depends on pressure under the disc to lift the disc.

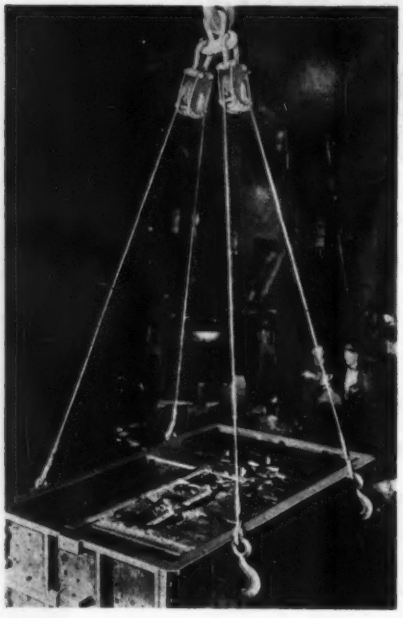
Another advantage is that in closing, the diaphragm type of valve will close at the set pressure, as compared with the disc type valve which goes below the set pressure by about 15% before the spring recovers from its momentary hysteresis and closes. It is obvious that there is no "weeping" or loss of pressure as a result of this valve bleeding down below the set point. These features make this Farris valve particularly applicable where the relief valve is to be used as a control valve—for controlling the pressure at the relieving point—rather than the use of a reducing valve.

"Level-Lift" Slings QC 578

The complete line of Macwhyte Caldwell "Level-Lift" Slings, all patented, are now made in ¾ ton, 1½ ton, 3 ton, and 6 ton capacities. Formerly they were made only in 3 ton and 6 ton capacities.

The operation of the sling is simple. After the light-weight block containing wire rope is put on the crane hook, the crane operator spots the crane hook over the approximate center of gravity of the load and the floormen attach the sling to the load.

The crane operator then applies the power to lift the load, and as the crane hook is lifted, the rope automatically adjusts itself through the "Level-Lift" block.

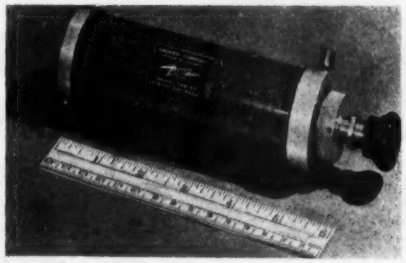


In so doing, one sling leg of rope becomes longer than the other, and as the weight of the load pulls on the wire rope, the sheave in the block pulls down against a brake which prevents slippage. The load is then lifted level.

Should the crane operator not get the block and crane hook close enough to the center of gravity of the load, it is only necessary for the operator to lower the load enough to relieve tension on the sling which releases the brake and then move the crane hook over a little to the true center of gravity. On applying the power, the ropes readjust themselves and the load rises level.

Panel Mounted Dry Air Pump QC 579

The midget panel mounted dry air pump developed by Andrew Co. is only 6″ long and 2″ in diameter. The small size makes it possible to mount this pump directly on a panel, thus becoming an integral



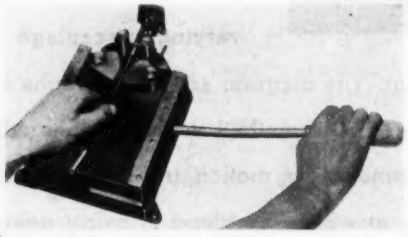
part of the apparatus which it pressurizes, and is always connected and ready for use on equipment requiring pressurizing. The output is 3 cubic inches per stroke.

Like the original Andrew Dry Air Pump, the Midget has a transparent plastic cylinder which contains the drying agent. The latter is blue until its dehydrating capacity is exhausted when it turns pink. At this time it may be reactivated or replaced.

Wire Stripper QC 580

A new wire stripper for stripping rubber, asbestos, synthetic, plastic, glass, cambric and other insulations is announced by the Ideal Commutator Dresser Co.

Any length of wire or cable, up to ⅝″ diameter—single or parallel conductor, can be stripped. Plain or grooved blades are used depending upon the type of wire.



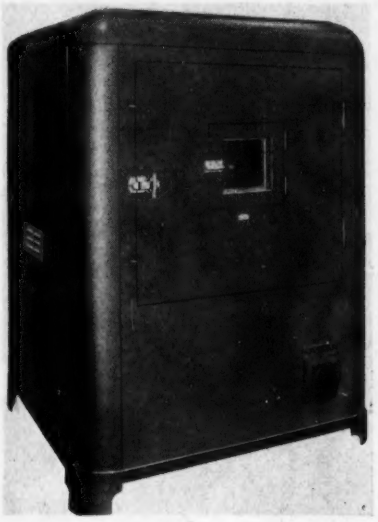
Parallel wire, heater cord, inner conductors and POSJ cord can be stripped with plain blades. The grooved blades are intended for rubber covered and weatherproof cable.

In use the wire is laid between the jaws and cutting blades of the stripper and the handle pulled. This causes the gripping jaws to grasp the wire and draw the wire in a straight line through the oscillating blades.

Important features include straight line pull with elimination of scraping and nicking of wire and automatic centering and gripping any diameter of wire without manual adjustment. The jaws instantly release the wire at end of stripping stroke and the blades, which are quickly interchangeable, open automatically to receive the wire when the lever is pushed forward. An adjustable stop can be added to provide for the length of stripping. Grooved blades are available in 15 standard sizes.

Industrial Oven QC 581

A compact and completely self-contained oven has been designed for laboratory and pilot plant use by the Industrial Oven Engineering Co. Sizes of oven working space in the new oven range from 3′x3′x3′ to 6′x6′x6′, in increments of 1′, and special sizes are furnished to specification. Temperatures range up to 900°F., with a guaranteed differential of ± 2°. This type of oven is usually furnished with electrical heating equipment, but is designed to use any type of fuel. In every case, the heating equipment is contained within the oven shell. The



smaller models are shipped assembled, ready to connect to the heat source.

The oven is designed particularly for precision experimental work in drying, baking, evaporating, polymerizing, aging and heat treating, especially in cases where highly volatile solvents are used. Regardless of the inflammability or explosiveness of the solvents, the oven has insurance company approval. It can be furnished with special construction to withstand corrosive fumes. Automatic temperature controls are provided.

Electrode Holder QC 582

A new armor-clad (screw type), fully insulated electrode holder has been announced by the Electric Welding Division of the General Electric Company. The new holder is recommended for use wherever durability, maximum safety, and minimum operator fatigue are desired.

A feature of the new holder is its head, which is completely enclosed in a sheath of aluminium armor. This armor protects

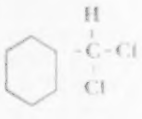
Hooker Toluene Derivatives give you a Choice of Highly Reactive Intermediates

HOOKER Electrochemical Company has done a vast amount of research with toluene and chlortoluene compounds. This has resulted in the development of many derivatives which together with the chlortoluenes, are being widely used as intermediates in many types of reactions. In these toluene derivatives Hooker has made available a number of chemicals which provide chemists with the benzyl group, $C_6H_5CH_2$—; benzal group C_6H_5CH= and benzoyl group C_6H_5CO—.

Listed below are some of these toluene derivatives. These Hooker chemicals are of the same high standards of purity and uniformity as are all Hooker chemicals. Bulletin 320, available when requested on your letterhead, gives additional information on these toluene compounds and derivatives and their behavior in typical reactions. Hooker Technical Staff is also prepared to help you in the use of these chemicals for your particular purposes.

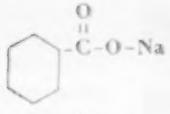
PRODUCT — *Chemical Formula* — *Molecular Weight* — **DESCRIPTION**

Benzal Chloride
$C_6H_5CHCl_2$; 161



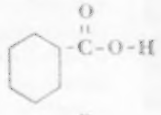
Water clear liquid

Benzoate of Soda
C_6H_5COONa; 144



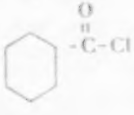
White crystalline solid

Benzoic Acid
C_6H_5COOH; 122.1



White crystalline solid

Benzoyl Chloride
C_6H_5COCl; 140.5



Water clear liquid

CHEMICAL OF THE MONTH

CHLORPROPANE LIQUID 170

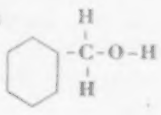
$C_3H_{1.5}Cl_{6.5}$ (Average)

To chemists working in plastics, rubber, paints, and sanitary chemicals fields, Hooker Research Laboratories suggest that an investigation of this new Hooker Chemical may prove advantageous. Chlorpropane Liquid 170 is a clear, colorless liquid with a characteristic odor, is insoluble in water and soluble in alcohol, ether and most chlorinated solvents. It becomes quite viscous at temperatures below −50°C. It is resistant to oleum, mixed acids, fuming nitric acid and hydrogen fluoride.

Among resins found to be compatible with Chlorpropane Liquid 170 are: acrylic resins, chlorinated rubber, vinyl polymers, polyterpene resins, polyvinyl chloride and natural rubber.

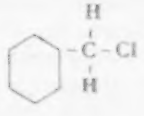
Technical Data Sheet No. 333 describes the physical properties of Chlorpropane Wax. Research samples will be supplied when requested on your business letterhead.

Benzyl Alcohol, Tech
$C_6H_5CH_2OH$; 108.1



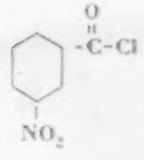
Colorless to light yellow liquid

Benzyl Chloride
$C_6H_5CH_2Cl$; 126.5



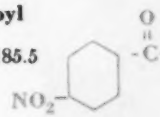
Clear, colorless to light yellow liquid

Metanitrobenzoyl Chloride
$C_6H_4NO_2COCl$; 185.5



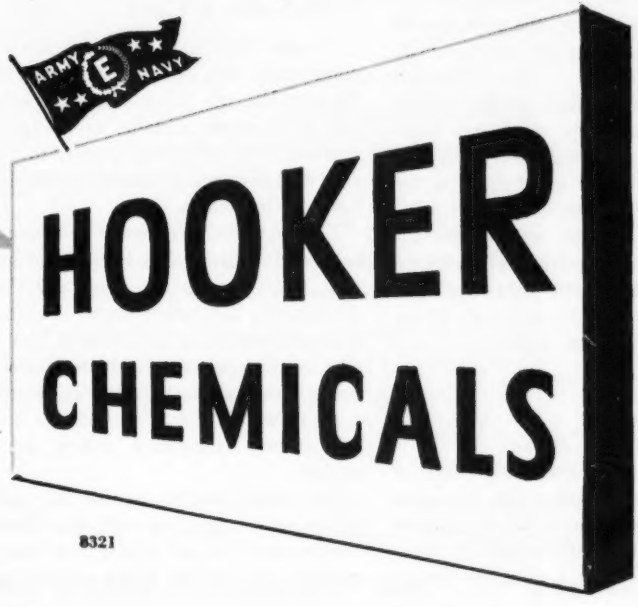
Yellow to brown liquid partially crystallized.

Paranitrobenzoyl Chloride
$C_6H_4NO_2COCl$; 185.5



Yellow crystalline solid

Benzoic Anhydride — **Benzyl Thiocyanate** — **Benzotrichloride** — **Monochlortoluene**



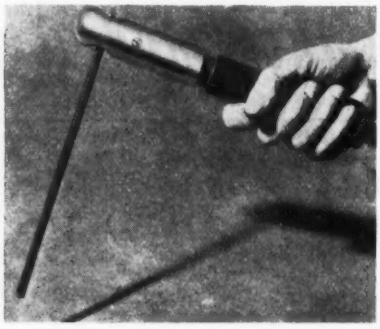
HOOKER ELECTROCHEMICAL COMPANY

3 Forty-Seventh Street, Niagara Falls, N. Y.

NEW YORK, N. Y. • **WILMINGTON, CALIF.** • **TACOMA, WASH.**

Caustic Soda — **Muriatic Acid** — **Sodium Sulfide**
Paradichlorbenzene — **Chlorine** — **Sodium Sulfhydrate**

the insulation, resists weld spatter, and eliminates the possibility of accidental contact with the welding circuit. Thus the

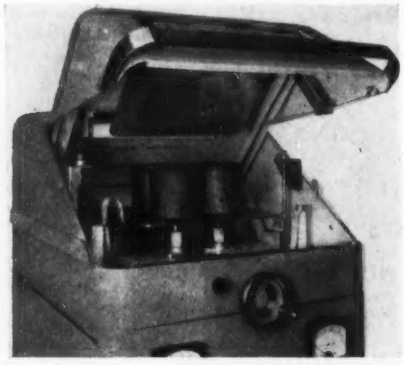


holder remains clean while in use and lasts considerably longer than insulated holders without armor cladding.

The holder is designed to accommodate electrodes up to and including ¼ in. in diameter. It is easy to use, light in weight (15 oz.), and unusually cool in operation and a slight twist of the hand tightens or releases the electrode. In use the holder firmly grips the electrode at the proper angle to maintain good current contact. This keeps the holder cool, tends to prevent overheating of the electrode, and maintains a uniform melting rate clear down to a stub end. The threads of the push-up rod do not carry current. A soldered cable connection also helps the holder to remain cool. The width of the electrode slot limits the size of the electrode which can be inserted, thus preventing overloading.

Dielectric Heater QC 583

A new dielectric heater, the Thermatron Heatmaster, for heating plastics, dehydration, and sterilization, has been introduced by the Thermatron Division of the Radio Receptor Co., Inc. It is stated



that more power is generated by the Heatmaster than by any other unit of its size, which is particularly designed for heavy-duty preheating in the plastic molding industry where floor space is at a premium.

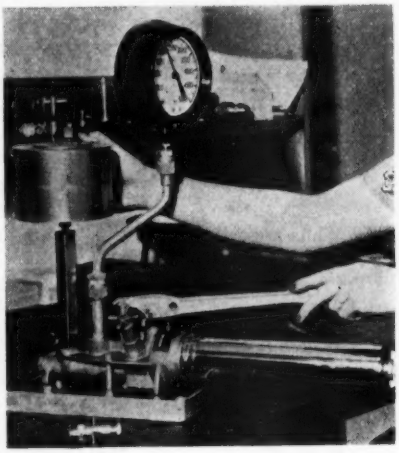
The unit is completely self-contained and ready-to-use, and incorporates a built-in electrode cage, automatic protection, heavy electrodes and new long-life radial-fin air cooled tubes. Other features include oversize casters for portability, safety interlocks, industrial type push buttons, overload relays and circuit breaker, connecting terminals, fully calibrated dials. Foot control and continuous-belt heating oven are available accessories.

The Heatmaster is capable of heating a 3.3 pound preform in one minute or a 5 pound preform in 90 seconds. Its capacity makes it suitable for rugged general purpose production as well as research requirements involving substantial power.

Thermatron units are available over an output range suitable for almost every purpose. The units which are supplied to operate at 15 or 30 megacycles frequency, with a frequency of 5 megacycles, optional, are the Thermatron Type K-500, 500 W output, Type K-1, 1 KW output, Type K-3, 2½ KW output, Type K-8, 7½ KW output, Type K-15, 15 KW output, and Type K-30, 30 KW output.

Gauge Tester QC 584

A new multi-purpose pressure gauge tester, developed by Mansfield & Green, Cleveland, combines for the first time in



a single unit a pressure gauge tester that can be used with equal facility for bench testing and for portable testing in the field. On bench testing, the unit can be used with test gauges or with a dead weight attachment.

A unique, but simple, doubly sealed check valve, completely eliminates leakage and loss of pressure even with grit in the system, whether using oil or water and for pressures up to 10,000 p. s. i.

Principal uses of the testing unit include testing and repairing of pressure gauges and instruments, the setting of relief or other pressure actuated valves and general hydrostatic testing.

High Vacu..m Recording Gage QC 585

The McLeod Type Recording Gage of the F. J. Stokes Machine Co. has been modified in such a manner that it will produce a continuous, visible record of pressure conditions within a vacuum system between the limits of 1000 and 5000 microns absolute pressure. The unit consists of a modified Stokes High Vacuum Gage, calibrated in microns, combined with a galvanometer type recording unit. The gage is mechanically tilted from the

horizontal (normal) position to the vertical (reading) position by an electric motor. The height of the measuring capillary and hence the vacuum in the system is electrically determined, this reading being automatically transmitted to the recorder.

The recording unit may be located at any distant point, but the instrument proper preferably is installed close to the sampling point. The "Vacorder" thus includes an indicating high vacuum gage at the sampling point and a recording unit at either the sampling point or some other location. A similar "Vacorder" instrument, with one recording unit and as many as four indicating instruments is available to record pressure in sequence on a strip chart.

These gages are the true McLeod type instruments similar to the portable indicating gages which have been in use for a number of years, but this is the first time such gages have been combined with a recording unit. This instrument is designed for continuous service, and with a built-in chemical trap which excludes gases and all condensable vapors, such as water, oils, and alcohol.

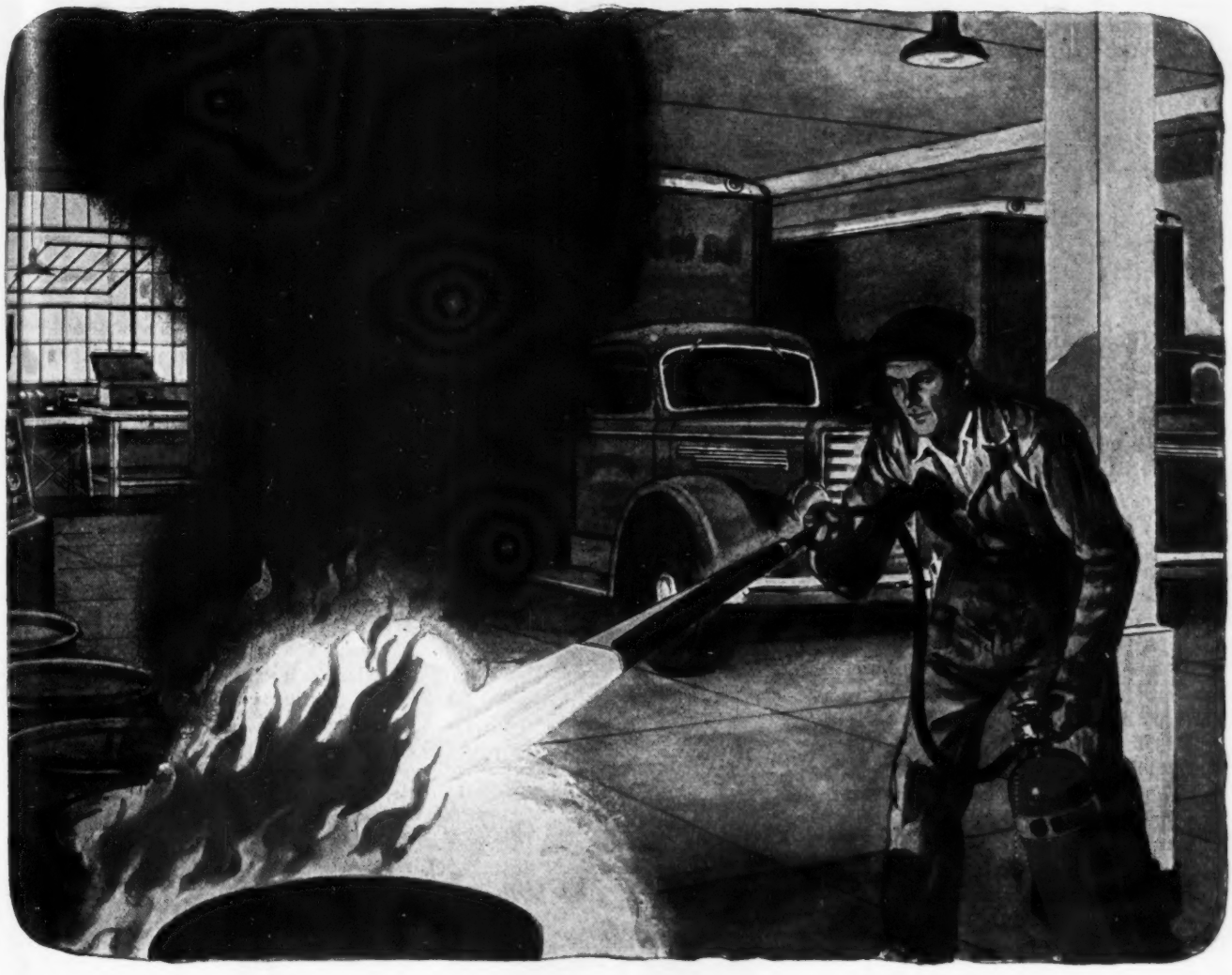
Lubrication Cart QC 586

A new Lubrikart has just been announced by the Alemite division of the Stewart-Warner Corp. designed to provide a complete portable lubrication department for industrial plants, to transport and dispense a variety of grades or types of lubricants.

The new unit, mounted on five-inch ball-bearing casters, is twenty-one inches wide, thirty-one inches long and thirty-seven and a half inches high. Pushed like a perambulator, it is intended for one-man operation and is able to travel between rows of machines or elsewhere in a plant where space is limited.

The new Lubrikart comes in two models.

The basic model carries two seven-gallon tanks equipped with low pressure pumps with five and a half foot hose and non-drip nozzles for filling oil reservoirs,



Deadly to fire . . . and only to fire!

It's sudden death to flames, of course — in flammable liquids or electrical apparatus — but that's just *one* of the outstanding advantages of Kidde equipment.

Equally important: dry, inert carbon dioxide gas — the fast, sure extinguishing agent used in Kidde equipment — is *completely harmless* to materials and machines.

Carbon dioxide gas cannot contaminate or dilute valuable liquids. Used on electrical fires, it will not soften or water-soak insulation. It's a non-conductor too — there's no danger of short circuits, or of shock to the operator. And there's no after-fire mess to be cleaned up.

Kidde portable extinguishers for small, isolated blazes in flammable liquids and electrical equipment; wheeled units and built-in systems for major hazards — all are deadly to fire, and *only* to fire. The Kidde line includes the *right* kind of protection for every tough-fire hazard in the accompanying list . . . ask a Kidde representative for full information — he's skilled in the ways of fire protection.

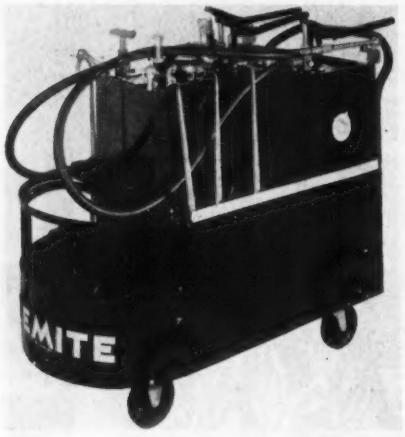
* * *

KIDDE KILLS TOUGH FIRES *in Process Rooms, Mixing Tanks, Agitators, Pump Rooms, Storage Areas, Drum-Filling Rooms, Motors, Transformers, and Electrical Control Panels.*

The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Walter Kidde & Company, Inc. • 140 Cedar Street • New York 6, N. Y.

hydraulic systems, or gear housings on machines; one seven-gallon tank with high pressure pump for loading handguns; two one and three-quarter gallon tanks



with oil transfer pumps for filling oil cans; six spout-type oil cans, and four lever-type handguns. There is also space for waste, replacement fittings, small tools or other material.

The second model has, in addition to the foregoing equipment, a high-pressure, hand-operated grease pump which holds thirty pounds of lubricant and has a five and a half foot lubricant hose fitted with a hydraulic coupler. This pump develops up to 7,000 pounds of pressure per square inch, and can be lifted clear of the Lubrikart and carried to point of use, if desired. All pumps, loaders and transfers are manually operated.

New Fire Extinguisher QC 587

A new fast-acting portable fire extinguisher, the Alfite Speedex, is announced by American-LaFrance-Foamite Corporation. It is made in 3 different sizes, Models 15, 10, and 4, and uses carbon

dioxide as the fire extinguishing agent. The numbers indicate the pound capacity of the gas.

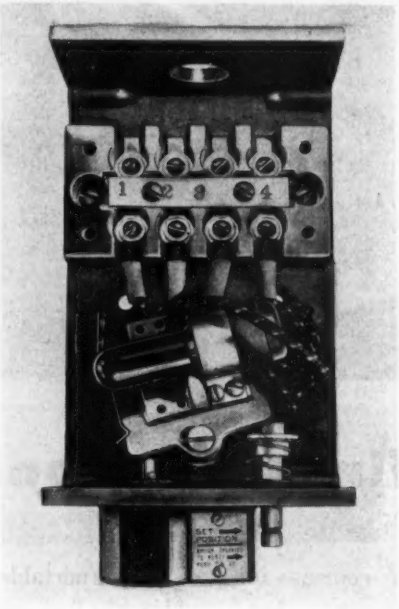
The Speedex operating valve lever is directly above the carrying handle. It can be instantly opened by the pressure of the hand grip and as quickly closed by releasing the hand pressure while operator is maneuvering his position. For continuous operation the D-yoke ring is slipped over the operating lever while it is depressed.

All models are approved by Underwriters' and Factory Mutual Laboratories. Models 4 and 15 also carry the approval of the U. S. Coast Guard.

Pressure Switch QC 588

The Kidde pressure switch now being offered for other uses, is an accessory device designed for use with built-in carbon dioxide fire extinguishing systems to assist in isolating the fire by automatically cutting off electrical circuits in fans, blowers or other electrical equipment when the extinguishing system operates. It is a self-contained, mercury contact-type switch suitable for applications which employ gas or air pressure.

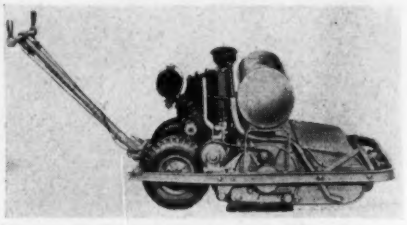
In use the pressure switch is connected by a bleed pipe from the main distribution line and is operated by the carbon



dioxide in passing through this distributing piping to the discharge nozzles. The gas pressure actuates a plunger which trips the breaker arm of the switch, opening or closing the circuits desired. The device is available for control of two, three or four circuits, each of which may be wired for normally open or normally closed operation and is provided with a manual reset to restore circuits to their original position after operation.

Sweeper QC 589

The new model Moto-Sweeper includes, among other refinements, a blower for cleaning out the corners and close to the wall. The blower, with a properly directed flexible metal tubing attached, blows the refuse and dirt into the path of the revolving brush. Other refinements include an improved method of laying the dust. Before air has been pumped into water tanks to provide pressure for a fine spray, but now air pressure

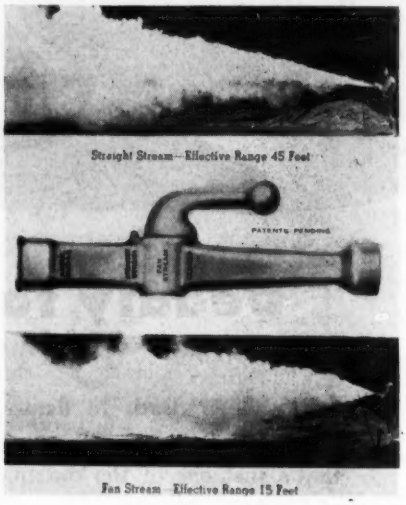


is applied at the nozzle, providing a more positive control and eliminating the high air pressures in the water tank. More accessible greasing connections are also installed on the brush bearings.

Moto-Sweeper is easy to operate, as it turns right or left under its own power by means of a separate handlebar-controlled clutch on each wheel of the tractor.

Dual Stream Fire Extinguisher Nozzle QC 590

The Dugas Division of Ansul Chemical Company announces the development and introduction of a new dual-stream nozzle which greatly increases the fire fighting effectiveness of wheeled model dry chem-



ical extinguishers. The new nozzle permits the operator to apply the dry chemical on a fire either as a long range straight stream or as a shorter range fan stream.

With this new dual-stream nozzle, overhead fires, heretofore considered exceedingly difficult to fight, can be extinguished successfully. Overhead fires were just one of many kinds of large scale fires which were quickly extinguished. Ansul's new dual-stream nozzle has been approved by the Underwriters' Laboratories and the Factory Mutual Laboratories.

Pumps QC 591

For pumping water or other liquids under high pressure, a new low capacity close-coupled rotary pump has been announced by Bump Pump Co. With ca-

TRIOXANE is "harnessed" formaldehyde. Perfectly stable in alkaline and neutral systems, it can be depolymerized with liberation of monomeric formaldehyde by small amounts of strong acid or acid-forming materials. The rate at which the monomeric formaldehyde is released is easily controlled by regulating the amount of catalyst and the temperature.

Thus Trioxane can be used as a source of formaldehyde for reaction with various materials. In many cases it provides better control of reaction, better control of the quality of the product formed, better yields, shorter reaction time, and a generally smoother reaction than is possible with aqueous formaldehyde solutions or other formaldehyde polymers. Its miscibility with many types of organic materials makes it possible to use it as a chemical intermediate in organic reaction media.

Molten Trioxane is a solvent for a wide range of materials, e.g., phenols, proteins, aromatic hydrocarbons, amides such as urea, and many other types of organic compounds. Concentrated aqueous solutions of Trioxane also have good solvent properties. For example, the protein zein is readily soluble in such solutions. It appears likely that Trioxane-zein compositions may find commercial applications.

Trioxane can be used also in formaldehyde-hydrocarbon reactions such as the production of chloromethylated compounds by reaction with aromatics and hydrogen chloride in the presence of zinc chloride. It may also be reacted with aromatics to give diaryl methanes and hydrocarbon-formaldehyde resins.

For further information about the properties and applications of Trioxane, sample lots for experimentation and technical assistance in a specific application, write to: E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Field Research Section, Wilmington 98, Del.

TRIOXANE

Cyclic trimeric polymer of Formaldehyde

PROPERTIES

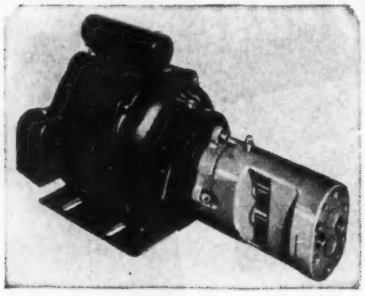
Colorless, crystalline compound	
Molecular Weight	**90.05**
Odor	**Mild, Pleasant**
Melting Point	**61°C**
Boiling Point	**115°C**
Vapor Pressure	
25°C	13 mm
86°C	283 "
114.5°C	759 "
129°C	1212 "
Flash Point	**45°C**
Density (molten) @ 65°C	**1.170**
Solubility	
Water	Readily Soluble
Alcohols	" "
Ketones	" "
Ethers	" "
Esters	" "
Chlorinated Hydrocarbons	" "
Aromatic Hydrocarbons	" "
Vegetable Oils	" "
Naphthalene	" "
Phenol	" "
Petroleum Ether	Slightly Soluble

DU PONT

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

DU PONT ELECTROCHEMICALS
FIELD RESEARCH SECTION

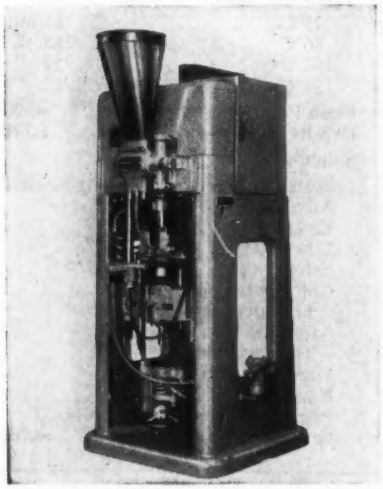
pacities ranging from ¼ gal. to 8 gals. per minute, this new pump will operate on vacuums as high as 26 inches, and will operate efficiently with water up to



500 lb. pressure; for oils or other viscous liquids up to 1000 lbs. pressure. It will operate at full motor speed of 1750 RPM on the lighter liquids, or 1200 RPM on heavier liquids. This new pump has a mechanical seal and is of the positive displacement type. The shaft is mounted on ball bearings. The pump can be furnished either with or without built-in by-pass and relief valves and is made of such metals as iron, bronze, nickel alloys, stainless steel, or Hastalloy, according to the requirements of a given job.

Automatic Molding Machine QC 592

Improvements, based on more than 7 years' experience, are now incorporated in the latest No. 200 D model Stokes Completely Automatic Molding Machine. Important among these is a new type trap or checking device, sensitive to the fraction of a gram, which weighs the finished moldings and operates a safety cut-off



to stop the machine in case all molded pieces do not eject into and pass through the trap. If a piece should stick in the mold or a molding be of insufficient weight, the machine will stop and signal for attention, practically eliminating damage to the mold or machine from double filling or other failure in operation.

Other features include an improved combination push-off that ejects mechanically in case the multiple air-jets do not blow the molding into the trap; also, an improved triple-feed device that is readily adjusted to distribute exact quantities of molding powder where desired in the mold.

The capacity of this machine is 15 tons; it molds parts with a projected area up to 14 sq. in. and diameters up to 4". Output with a single cavity mold is up to 10 thousand or more moldings per week (168 hours) and with sub-cavity molds up to 10 thousand or more per day, depending on the size of the part.

The machine is self-contained, fully automatic, thoroughly safeguarded, and requires a bare minimum of operating attention. It is electrically heated and powered and only requires 5 H.P.

Safety Clothing QC 593

A complete line of Ply-Garb clothing for men and women, affording protection against oils, acids, caustics, water, dust and fumes, is announced by The Milburn Company. The augmented Ply-Garb line

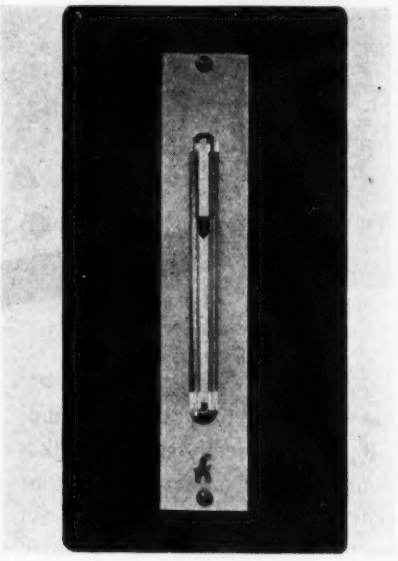
includes sleeves, aprons, overalls, coveralls, slacks, jackets, cape sleeves and bib combinations, bolero jackets, caps and hoods.

Ply-Garb creations are fabricated from cotton or duck, specially processed with plastic and are available in both single and double-coated fabrics for both ordinary and heavy-duty wear. Each garment is designed to the recommended specifications of the United States Public Health Service, with features that assure complete comfort and remarkable durability. The versatility of these garments has opened hundreds of new fields of application.

In addition to the Standard Ply-Garb line, The Milburn Company offers a custom service, preparing designs and samples to specifications to meet unusual circumstances or peculiar hazards.

Rotameter QC 594

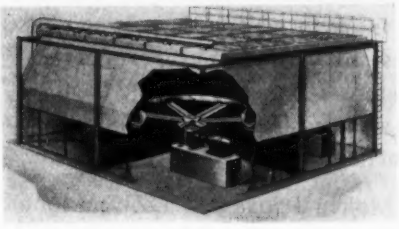
The new Schutte & Koerting panel-mounted Rotameter is designed to answer the growing need for panel centralization of instruments that indicate pressure, flow, and temperature. Although the instrument is basically the S-K Universal Rotameter,



the panel-mount has a frosted glass window with a central clear-glass aperture and is installed flush in the panelboard, with the Rotameter supported directly behind. Provision is made for adequate back-lighting and ready maintenance accessibility.

Cooling Unit QC 595

Cooling sections are constructed with K-fin tube construction and are cooled by forced draft fed by air from the cooler layer at ground level. Vertical air flow against static head is supplied by fans with variable pitch blades and with variable speed drive for even air distribution over cooling surfaces. Fin Fan Units are



designed for pressures to 5,000 psi and temperatures to 1,500° F. Coils are located to provide sufficient static head for pump suction. Tubes can be removed and replaced quickly, all mechanical equip-

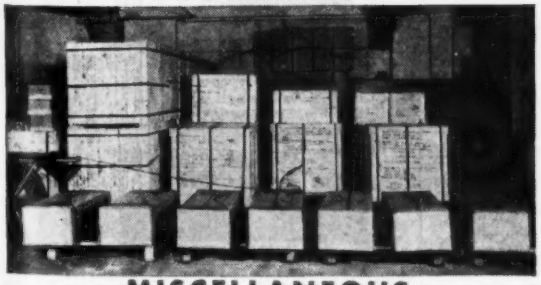
IMPORTANT

BECAUSE IT PROTECTS

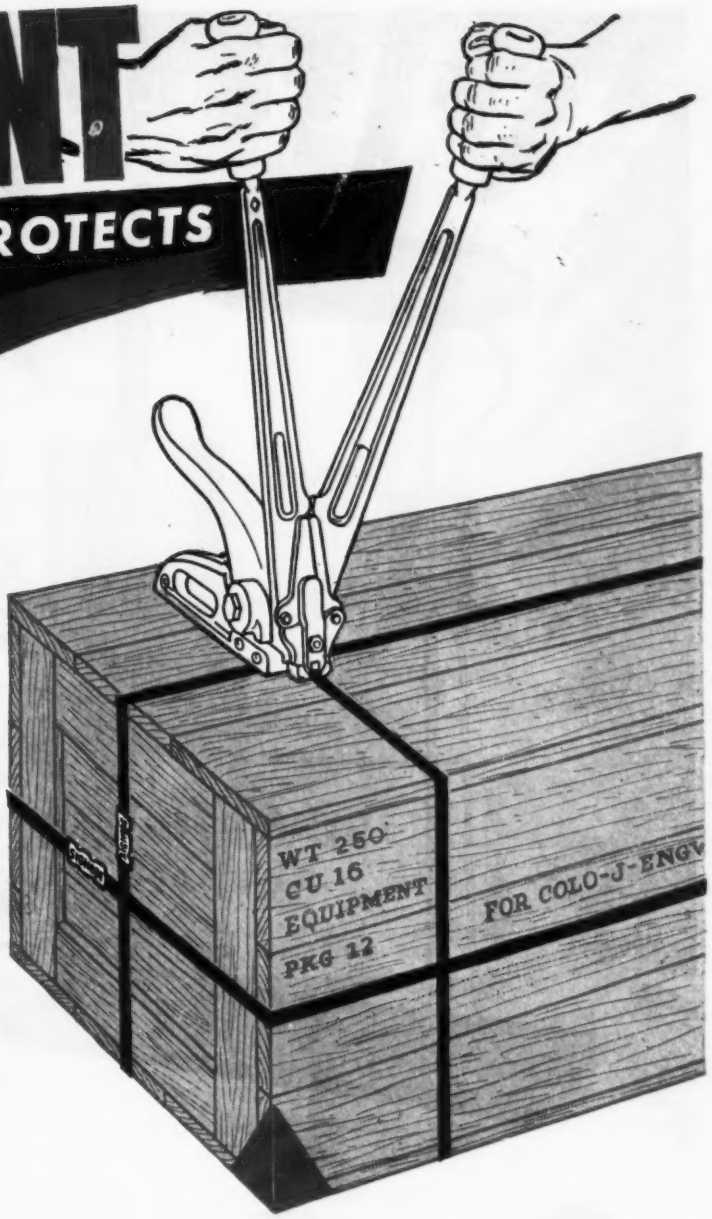
CARLOADING

WAR MATERIAL

BUNDLING



MISCELLANEOUS



Industry is meeting the challenge of America's mass production schedule . . . but production alone is of little value unless the material reaches its destination in UNDAMAGED, USABLE CONDITION!

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STEEL STRAPPING CO.

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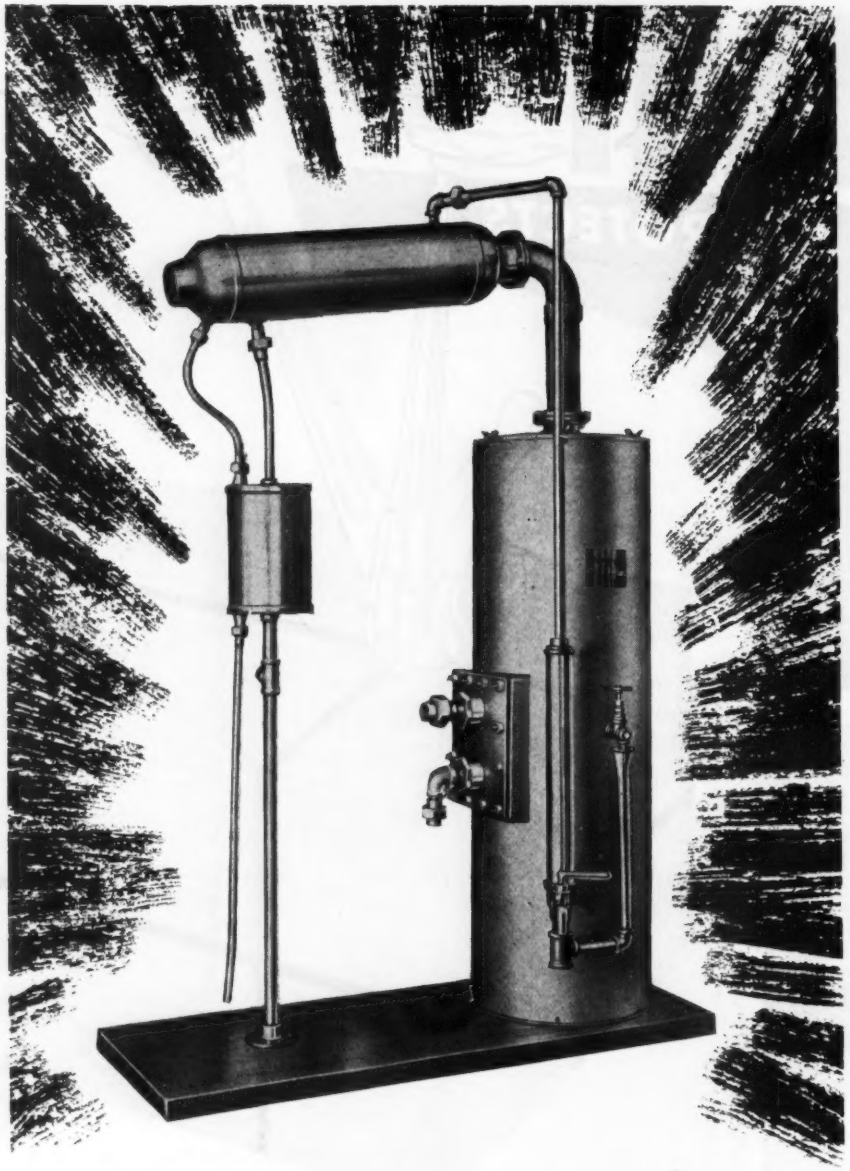

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with a BARNSTEAD water still

For even the most exacting applications, the "Five-Way Purity" of Barnstead Distilled Water offers you complete protection. Whatever your standard for pure water—chemical, bacteriological, or pyrogenic—Barnstead will more than meet it. Moreover, the distillate does not vary from this high standard from day to day . . . . it is consistently pure. Still sizes range from ½ to 1000 gallons per hour. Operation is by steam, gas, or electricity. For further information, send for Catalog "D".

Barnstead
STILL & STERILIZER CO. Inc.

49 LANESVILLE TERRACE, FOREST HILLS, BOSTON 31, MASS.

ment being readily accessible from the ground. The Fin Fan Unit is a result of the combined efforts of the Griscom-Russell Company and the Fluor Corporation, Ltd.

Wire Belt Hooks QC 596

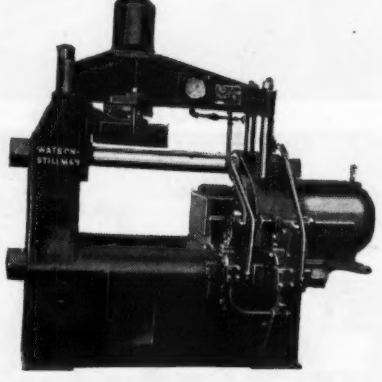
The Bristol Company, Mill Supply Division, has announced the addition of a line of hinged-type wire belt hooks, known as Bristol's Belt Hooks, to its line of belt lacing products. The new hooks are designed for joining all types of flat belting, including leather, fabric, rubber, and balata belts. Various sizes are offered to take care of belts up to ⅜ inch thick.

A new method of mounting the hooks in the spacer card makes it possible to leave the card in place in the lacing machine during the lacing operation. The hooks are thus held in accurate alignment until the hook points pierce the belt. It is not until after the lacing operation has been completed that the card is removed. This method of carding insures a uniform spacing of the hooks and results in an even distribution of pull over the width of the belt.

The hooks are designed in such a way as to enter the belt in two rows with each opposite point passing into the belt in alternate rows. The purpose of this arrangement is to eliminate interference between opposite hook points as they are pressed into place and also to distribute the grip on the end of the belt over a greater area.

Angle Molding Press QC 597

For molding plastic products requiring split molds, and for molding complicated parts by the transfer method, the Watson-Stillman Co. has brought out two newly designed angle molding presses. The outstanding feature of these machines is the



elimination of manual handling of split mold sections, thus reducing maintenance cost of such molds, and greatly increasing production rates.

These presses are of all-steel construction, except for the rams, which are close-

(*Turn to page 125*)

THREE NEW PRODUCTS
from Columbia Research Laboratories

Butyl Diglycol Carbonate

Diethylene Glycol Bis(n-butylcarbonate)

$(C_4H_9-O-CO-O-C_2H_4-)_2O$

Butoxyethyl Diglycol Carbonate

Diethylene Glycol Bis(2-n-butoxyethylcarbonate)

$(C_4H_9-O-C_2H_4-O-CO-O-C_2H_4-)_2O$

Phenyl Diglycol Carbonate

Diethylene Glycol Bis(phenylcarbonate)

$(C_6H_5-O-CO-O-C_2H_4-)_2O$

Butyl Diglycol Carbonate, Butoxyethyl Diglycol Carbonate, and Phenyl Diglycol Carbonate are new colorless organic ether-esters of low volatility. They are substantially insoluble in water and are very stable to hydrolysis by water. They can yield only neutral products and carbon dioxide when hydrolyzed. The new compounds are widely soluble in organic solvents, and are compatible with many resins and plastics. The properties of these Diglycol Carbonate esters suggest that they may be used to advantage as plasticizers, high-boiling solvents, and softening agents, as well as in pharmaceutical and lubricant compositions.

Principal properties are shown below.

Additional Data on Request

Technical Bulletins containing additional information are available through our General Sales Offices. These data may indicate potentialities for your products. You can obtain samples—at no charge—for use in your laboratories.

PROPERTIES OF DIGLYCOL CARBONATE ETHER-ESTERS

Property	Butyl Diglycol Carbonate	Butoxyethyl Diglycol Carbonate	Phenyl Diglycol Carbonate
Formula	$C_{14}H_{26}O_7$	$C_{18}H_{34}O_9$	$C_{18}H_{18}O_7$
Molecular Weight	306.4	394.5	346.3
Physical State	Liquid	Liquid	Solid,m.p.40°C.
Sp. Gr., 20°C./4°C.	1.08	1.08	1.23
Refractive Index, 20°C.	1.437	1.443	1.525
Viscosity, centipoises at 20°C.	14	22	1370 (Supercooled)
Boiling Point, °C.	175 (3mm. Hg.)	215 (4mm. Hg.)	—
Flash Point, °F.	372	390	460
Evaporation Rate at 100°C., mg./sq. cm./hr.	0.59	0.12	0.026

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PACKAGING & SHIPPING

by T. PAT CALLAHAN

I.C.C. Changes Freight Rates

THE NEW I. C. C. ruling on freight rates recently announced refers only to class rates and does not take into consideration commodity rates or exceptions. A great many chemicals are shipped under commodity rates or exceptions; consequently, the new rates will not apply to them. However, chemicals shipped under class rates will be affected. By order of the I. C. C., effective August 30, 1945, class rates in Official Territory will be increased 10% and class rates in southern and western territories and interterritorially between all territories will be reduced 10%. The permanent basis which will eventually apply will take a long time to work out.

T. Pat Callahan

Handling and Storing Boxed Glass Carboys

The practice of handling and storing boxed glass carboys recommended by the Manufacturing Chemists' Association has been outlined in a 1945 revision of Manual Sheet C-2. Some of the pertinent recommendations are as follows:

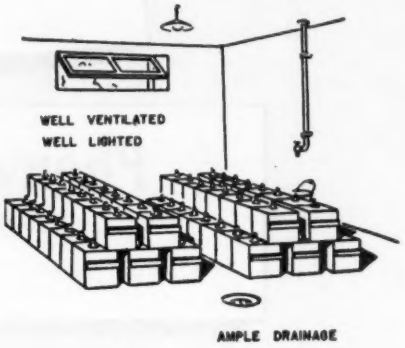
Breakage may result from rough handling or dropping; freezing of contents; adverse storage conditions; fire or explosions; careless use of wire cutters; or removal of bottles from boxes. Another cause of failure is the development of excessive internal pressure. This is often due to the use of air pressure for emptying. Other causes are expansion of liquid due to extreme rise in temperature; insufficient outage; and insufficient venting at the stopper, especially during storage.

All carboys should be inspected upon receipt and damaged ones set aside for special handling. None should be moved until the closure is examined, and neither should they be handled by the neck or by the closure. Hooks should not be used, nor should the carboy be "walked" along the bottom edges of the box. The neck should never be tilted toward a workman, and it is mandatory that emptied carboys be completely drained. Failure to do so violates ICC regulations.

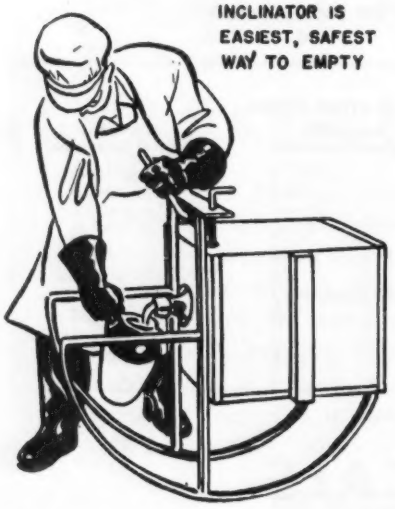
Carboys should be stored under cover to prevent deterioration of the boxes and cushioning material. Those containing volatile liquids should be vented occasionally in warm weather to prevent breakage. Special precautions on carboy labels should be rigidly observed.

Further directions and precautions are given for opening and emptying carboys, storing empty ones, and loading boxcars.

A specially designed truck for handling carboys picks up, carries, and sets down the boxes without the worker's touching them.



Carboys are best stored on treated concrete floors under cover. Adequate drainage, ventilation, and light should be provided.



An inclinator like this or a siphon should be used to empty carboys. They should never be discharged by air pressure, since the chance of breakage and spattering is enhanced.

The worker should wear tight-fitting goggles or a face shield, rubber boots, apron, and gloves of rubber or acid-resistant materials when handling carboys.

Wooden Barrels and Kegs

Continuing our discussion of the I. C. C. specification packages, we shall describe two kinds of wooden barrels which are specified under the regulations for the transportation of dangerous articles: namely, the tight barrel and the slack barrel. The specifications for the tight barrels are ICC 10A, 10B and 10C, and the specifications for the slack barrels are ICC 11A and 11B.

The ICC 10A has the most stringent specifications of all the barrel specifications and sets up rigid requirements as to staves, heads and hoops used. The materials from which the ICC 10A barrels may be constructed are white oak, chestnut oak, red oak, black cherry, or Douglas fir; quarter sawed with the grain, from straight-grained timber, so that no annual ring shall slope over half the thickness of stave or head; thoroughly kiln dried, moisture content 7% to 11%; free from rotten sap, checks, pitch pockets, cat faces, seed and worm holes in excess of 15 in one container; and other defects that show

How to make the Japs lose face and SAVE MATERIALS

The Jap prisoners, shown above, have lost face — plenty! But, thanks to Multiwall Paper Bags, they are saving materials . . . by the truckload.

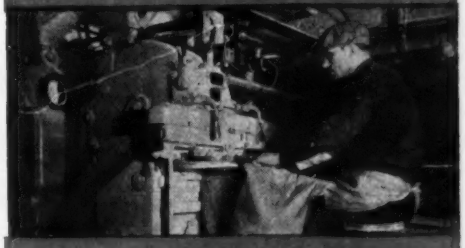
For, Multiwall Paper Bags have ample strength to prevent losses of materials caused by breakage . . . rough or careless handling. These bags are made from 2 to 6 thicknesses of tough paper and specially treated inner plies.

And, because Multiwalls are moisture resistant, they guard materials from damaging dampness in storage or in transit.

On home fronts as well as fighting fronts, you'll find that Multiwall Paper Bags are "delivering the goods" most efficiently and economically. If you want to know how they can save money and material for you, write or call your nearest St. Regis office TODAY!

Tight, sturdy Multiwalls prevent losses caused by siftage or infestation. They also help to keep storerooms clean.

Because Multiwalls are easy to stack and handle, they save valuable loading and unloading time.



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Montreal, Quebec
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through on both sides. The staves must be even and circular; croze center to be within 1⅛" of end of stave; stave end to have ⅛" free from bevel. The thickness of staves vary from ½" for a 5-gallon keg to ¾" for a 50-gallon barrel. This thickness refers to staves finished on one side. One-sixteenth inch must be added to unfinished staves.

The heading must be of uniform thickness and properly circled; planed on outside and properly jointed and glued, or doweled and flagged; dowel diameter not over 5/12 thickness of head. Heading thicknesses range from ⅝" for 5-gallon kegs to 1" for 50-gallon barrels.

Hoops range in gauge from 19 gauge for a 5-gallon keg to 17 gauge for a 50-gallon barrel. The correct hoop specification for each hoop according to its position on the barrel is also specified.

Lining of ICC 10A barrels is permitted as prescribed in the regulations or otherwise appropriate for the contents which are to be placed in the barrel.

Tests required are as follows:

"*Type test*:—Sample container at least 2 days old shall not increase more than 10% on diameter of head when all hoops above bilge are removed.

Figure 1—Parts and Dimensions of ICC 11A Barrel

Authorized Net Weight (Pounds)	Heading				Staves	Metal Hoops****	
	Diameter Not Over*** (Inch)	Thickness at Least, Wood Group A (Inch)	Thickness at Least, Wood Group B (Inch)	Number of Pieces Not Over	Length Not Over*** (Inch)	Width (Inch) by Birmingham Wire Gauge (minimum), Head	Width (Inch) by Birmingham Wire Gauge (minimum), Quarter** and Bilge
350	16	½	½	3	28	1⅝x23	1⅜x23
450	16	½	⅝	3	28	1⅝x23	1⅜x23
600	16	⅝	⅝	3	28	1⅝x23	1⅜x23
350	17	½	½	4	30	1⅝x23	1⅜x23
450	17	½	⅝	4	30	1⅝x23	1⅜x23
600	17	⅝	⅝	4	30	1⅝x23	1⅜x23
350	19	½	½	5	34	1⅝x22	1⅜x23
450	19	½	⅝	5	34	1⅝x22	1⅜x23
600	19	⅝	⅝	5	34	1⅝x22	1⅜x23
350	21	½	½	5	34	1⅝x21 or 2x22	1⅜x23
450	21*	½	⅝	5	34	1⅝x21 or 2x22	1⅜x23
600	21*	⅝	⅝	5	34	1⅝x21 or 2x22	1⅜x23

* Head battens required; at least 1½"x3½"; ends rounded to fit chime; securely nailed to heads.
** Quarter hoops not required for 350 pounds authorized net weight.
*** Tolerance of ⅛" authorized.
**** Wooden hoops authorized: 8 for 350 pounds net; 10 for 450 pounds net; 12 for 600 pounds net.

Leakage test:—Required for each lined container; by pressure at time of sizing or air pressure of at least 5 pounds per square inch; leakers to be repaired and retested."

ICC 10B varies from ICC 10A in that the requirements for staves, heading and hoops are not so rigid; hence, an ICC 10B is more economical to use than ICC 10A and ICC 10C is more economical to use than either ICC 10B or ICC 10A.

These specification tight barrels are used extensively in the chemical industry and are permitted for a great number of inflammables, both liquid and solids, poisonous solids and liquids, and when lined with rubber are permitted for the shipment of hydrochloric acid or hydrochloric acid mixtures. For hydrochloric acid of not over 20% strength (13.25 Bé) or other corrosive liquids containing not over 20% hydrochloric acid, specification ICC 10A with an asphaltum lining may be used. Other uses for an ICC 10A barrel lined with asphaltum are in the shipment of hydrofluoric acid of not over 30% strength and hydrofluosilicic acid. We mention these, but there are other materials which may be shipped in lined ICC 10A barrels. If this type of container is required for a material of a hazardous nature, reference to the I. C. C. Regulations will determine which specification may be used for the different products.

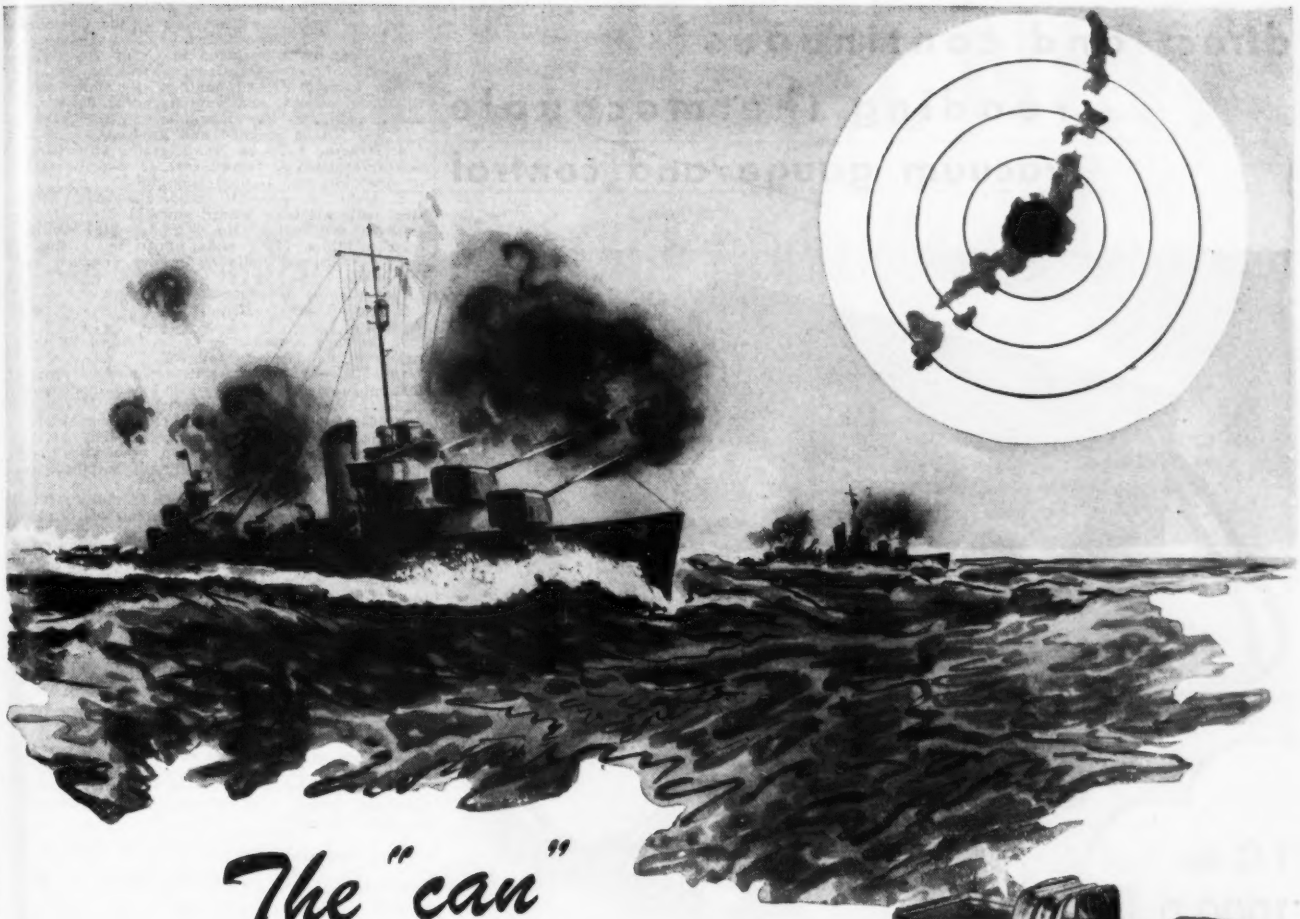
The ICC 11A barrel and the ICC 11B slack barrel carry specifications having to do with staves, heading and hoops and we quote the specification ICC 11A in full:

"1. *Compliance*:—Required in all details.
2. *Classification of woods*:—As follows:
Group A—Oak, Beech, Maple, Elm, Red Gum, Sycamore, Hackberry, Birch, Douglas Fir, White Ash.

Store slack barrels on end, not more than two or three tiers in height.

Best method of storing tight barrels is on wooden or metal racks.

Store tight barrels on the bilge or side, always with the bungstave up.



The "can"

THAT PACKS A SHELLACKIN'

THE lethal qualities of the United States destroyer, as of all our naval craft, have made a lasting impression on the Japs.

Shellac plays an important role in helping to maintain this deadliness. Shellac increases the effectiveness of electrical insulation, helps to protect guns and ammunition against harm from salt air and water, affords equal protection for thousands of peacetime products.

Protecting shellac itself calls for special "know how" in packaging . . . demands containers with special characteristics.

To make sure of packaging their product safely, William Zinsser and Company, Inc., New York, makers of Bulls Eye Brand shellac, use Crown cans.

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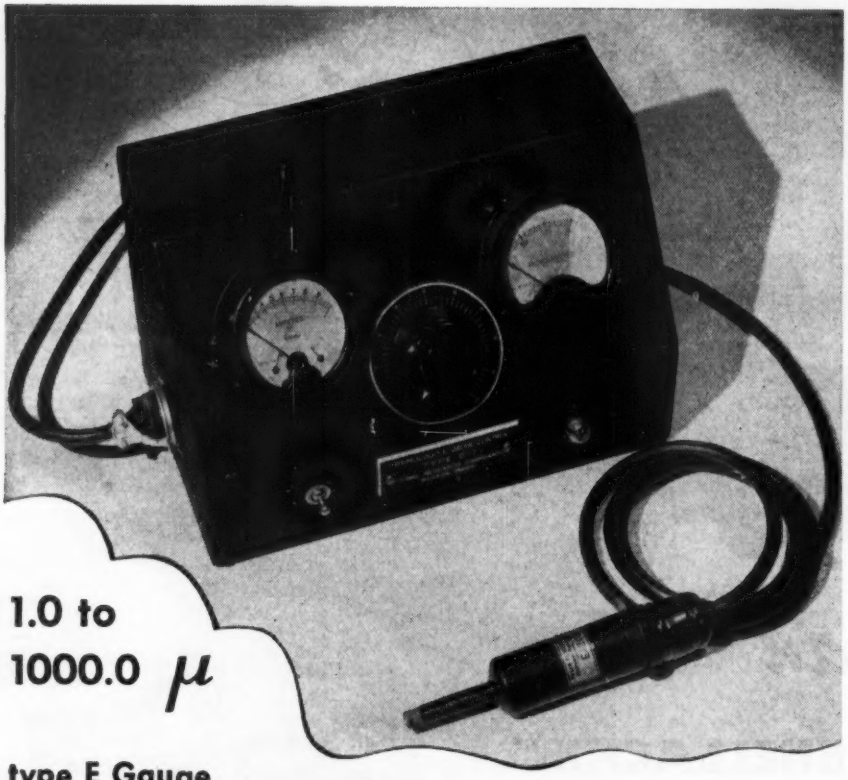
direct and continuous reading thermocouple vacuum gauge and control



1.0 to 1000.0 μ

type E Gauge

Improved "hot wire" type — welded metal tube — stable elements for operation at atmospheric pressure without danger to filament — dependable, accurate — sensitivity of 1.0 to 1000.0 microns.

type E-1 Control

Light, compact, rugged — indicates pressures continuously and directly in microns Hg — for 110 volt 50/60 cycle operation.

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The practical, convenient precision test unit for low pressure measurement and vacuum leak detection.

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High Vacuum for Industry

Yours on request. Thermocouple Gauge and Control Bulletin G2. Write today.

Group B—Cottonwood, Basswood, Tupelo Gum, Pine, Chestnut, Willow.

Note:—Because of the present emergency and until further order of the Commission, cottonwood and poplar are authorized to be included in Group A woods.

3. (a) *Staves:*—Of Group A woods, No. 1 grade, kiln dried; of uniform thickness well equalized, circled, and jointed; minimum thickness 5 staves to 1⅞" maximum width 5½".

(b) To be tongued and grooved.

4. *Heading:*—To be No. 1 grade, kiln dried, uniform thickness, turned true to size, dressed on one side, and jointed and glued.

5. *Metal hoops:*—Of cooperage-grade hoop steel with one edge beaded and glued.

6. *Wooden hoops:*—No. 1 grade coiled elm at least 9/32" x 1⅜"; ends joined by 1 staple and 2 additional nails or staples clinched on the inside.

7. *Parts and dimensions:*—As shown in Fig. 1.

8. *Head liners:*—Required as provided in paragraph 13.

9. *On each container:*—To be applied by the maker on top head as follows:

(a) ICC—***; stars to be replaced by specification number under which container was made, followed by the authorized gross weight (authorized net weight plus tare weight; for example, ICC—11A475, ICC—11B370, etc.). This mark shall be understood to certify that the container complies with all specification requirements.

(b) Name or symbol (letters) of maker; this must be registered with the Bureau of Explosives and located just above, below, or following the mark specified in (a).

10. *Size of marking* (minimum):—¾" high for head diameter over 17"; ½" high for others.

11. *Closing heads:*—To fit well in croze and be secured by nails or staples at 8" spacing through hoops into heads.

12. *Head battens* (when required by par. 7):—To be fastened at each end by ½" metal strapping nailed over chime and under hoops.

13. *Head liners:*—To extend across grain, circle at least ½ of circumference, and be nailed or stapled at 5" intervals. Required for containers with wooden hoops when net weight of contents to exceed 250 pounds.

14. *Quarter and bilge hoops:*—To be redriven and fastened by 4 fasteners for each hoop; puncture fastening at 8" intervals authorized for metal hoops."

This specification container is used extensively in the chemical industry as an outside container as well as by itself; that is, it is used as the outer covering of another container placed therein. The inside package containing hazardous material may be glass, earthenware, metal or other material. The amount of product which may be packed in an ICC 11A or ICC 11B, whether used as an outside container or by itself, is sometimes regulated; for instance, poisonous solids may be packed in an ICC 11A barrel or keg, but the net weight of content cannot be over 115 lbs. An inside container may be regulated as to quantity, such as 2 gallons, which limits the size of the ICC 11A or 11B keg when used as an outside container.

As is usual, the ICC 11B is not as rigid in specification as the ICC 11A and is slightly more economical to use. However, in many cases where the ICC 11A may be used, the ICC 11B is not permitted. Consequently, reference to the regulations is absolutely necessary.

Increase in Paper Sacks

An increase of approximately 18,000 tons of paper for paper shipping sacks over any previous authorizations, because of additional demands by claimant agencies, is included in 1945 third-quarter allocations, members of the Paper Shipping Sack Industry Advisory Committee were told at their recent meeting. WPB's Requirements Committee has authorized the use of about 108,000 tons of kraft paper for shipping sacks.

ADVERTISEMENT—*This entire page is a paid advertisement.* *Prepared Monthly by U. S. Industrial Chemicals, Inc.*

U.S.I. CHEMICAL NEWS

July ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1945

Resin-Plasticizer for Urea and Melamine Pinch Hits for Alkyds

Aroplaz 1311 Proves Practical Substitute for Certain Scarce Phthalic Alkyd Resins

Favorable reports from coating manufacturers give evidence that S & W Aroplaz 1311 has proved successful as a substitute resin-plasticizer for use with urea and melamine resins in the formulation of bake-coatings. Introduced not quite a year ago as a replacement for scarce alkyds, this new resin has, after continued observation and testing, shown surprisingly high outdoor durability.

Because urea and melamine resins lack sufficient flexibility and adhesion, they are rarely used alone in baking finishes. Alkyd resins have usually been added to secure these qualities. However, the supply of phthalic anhydride, from which alkyd resins are made, is so scarce that only the very highest military end-use requirements can be met. Moreover, very few resins, other than alkyds having a phthalic content, are compatible with urea and melamine. Those that are compatible usually do not furnish the desired flexibility and adhesion.

High Compatibility

Although free from any phthalic content, S & W Aroplaz 1311 is highly compatible with both urea and melamine resins and, at the same time, imparts required flexibility without inducing excessive softness or lack of resistance. It also works well with nitrocellulose and is being used as a resin-plasticizer in lacquer. With practically all raw materials in scarcity and under some kind of government allocation and control, end-uses still control the availability of S & W Aroplaz 1311, but these are of a far less critical nature than those for phthalic alkyd type resins.

Specifications

Solution	59-61% Solids (in High Solvency Naphtha)
Viscosity (G-H)	S-V
Acid Value of Plastic	25-30
Color (G. H. 1933)	8-10
Wt./gal. at 25°C.	8.2 lbs.

Diversification Keynotes Dodge & Olcott Merger

U.S.I. Management Sees Acquisition of Famous Essential-Oil House Adding Tremendous New Scope to Its Services

In acquiring the assets and business of Dodge & Olcott Company, one of the country's largest essential oil houses, U.S.I. has extended its activities into another important branch of the chemical industry. Dodge & Olcott manufacturers, imports, and distributes a line of products numbering well in the hundreds. The line includes important new insecticide concentrates, as well as a full range of essential oils, perfume bases, flavor bases, etc.

"D & O" Organization Unchanged

No changes are contemplated in personnel or organizational set-up of Dodge and Olcott. It will continue to operate as a separate company under its present management, which is headed by Francis T. Dodge, President and Charles A. Myers, Valentine H. Fischer, and Charles O. Homan, Vice Presidents.

Insecticide Market Looms Large

"D & O" has played a key role in the development of the much-heralded aerosol "bomb", used so successfully by our Armed Forces to rid tents, buildings and airplanes of mosquitoes and other insects. It was this company which first developed a pyrethrum of sufficient purity to be non-irritating and

(*Continued on next page*)

Photo Courtesy of Westinghouse

The aerosol "bomb" in action. One six inch dispenser contains enough insecticide to end insect life in 150,000 cubic feet of space. The pure pyrethrum extract developed by "D & O" contributed much to the success of these bombs.

Limited Quantities of Indalone Available

As this issue of U.S.I. Chemical News goes to press, limited quantities of Indalone, the insect-repellent which has been used in such large quantities and with such success by the armed forces, are available for civilian end uses.

Prepares Pectic Compounds of Greater Gelling Power

According to claims made in a recently granted patent, pectinic acid of superior viscosity, and therefore superior gelling power, can be obtained in far shorter time and under excellent control, by using enzyme pectase. Following adjustment of the methoxy content of apple pommace extract to the desired percent, the extract was adjusted to pH 6.5, tomato juice serum added, and as acidity developed, the pH was maintained at approximately 6.5 with sodium hydroxide. After addition of the proper amount of sodium hydroxide, pH was dropped to 4.0 by the addition of hydrochloric acid. The mixture was then heated, cooled, and the pectic acid precipitated out with either acetone or ethanol.

Gelling powers of pectic compounds in general depend to a great extent on molecular weight, or degree of aggregation, of the compound. Conventional methods for removal of methoxy groups from pectin largely destroy this aggregation and hence yield products of low gelling power.

New Cellulose Acetate Process Promises Improved Plastics

A New Jersey inventor appears to have found a practical way to take much greater advantage of the high oxidation and moisture resistance of cellulose triacetate than has ever been done in the past. His unique use of low temperatures to make acetates of high acetyl content soluble in acetone, ethyl acetate and other conventional acetate solvents should facilitate the manufacture of a whole range of products with improved chemical, physical and electrical characteristics.

Cellulose triacetate has long been known to have important advantages over the partially acetylated cellulose commonly used in commercial practice. It is more stable to light, oxidation and hydrolysis. It has excellent electrical insulation which is less affected by high humidity. The trouble has always been that it could not be dissolved in ordinary solvents, except chlorinated hydrocarbons whose toxicity and corrosiveness made them impractical. Also, the high melting point of the triacetate, and its lower solubility in plasticizers, required the use of a solvent that could readily be removed.

The new process, on which a patent has just been granted, is founded on the discovery that when the triacetate is maintained in contact with a solvent like acetone at a low temperature (from −10 to −75 C) for a sufficient period, a swelling action occurs. As the swollen gel is warmed to room temperature, it becomes fluid and forms a workable solution.

ADVERTISEMENT—*This entire page is a paid advertisement.*

July ★ **U.S.I. CHEMICAL NEWS** ★ 1945

Dodge & Olcott Merger

(Continued from preceding page)

to function properly in the "bomb". It was "D & O" who first put this extract into large-scale production, thus expediting the whole aerosol program.

This and other "D & O" developments will dovetail profitably with the intensified activities of U.S.I. in the insecticide and insectifuge fields. Indalone, the U.S.I. insect repellent which is now rendering yeoman service in the Pacific, is expected to find rapidly increasing use in peacetime consumer products. Further U.S.I. developments in the insecticide field will channel through "D & O" and contribute to their service in the industry.

Historic Company

Founded in 1798 by Robert Bach, Dodge & Olcott Company is one of the three oldest companies in the United States. It is also one of the most interesting, for its business is truly "global" in scope. Madagascar, Java, China, Egypt are but a few of the far-flung areas of the world from which its imports come. It imports or processes products — ranging all the way from ambergris to wormwood oil — which are obtained from thirty or more different countries. In finished form, these products are sold in an equal number of foreign markets.

Old in years, Dodge & Olcott is young in its approach to modern problems. Perhaps the best example of this is the company's ingenuity in providing practical substitutes for certain imported materials that have been cut off by the war. Mr. Dodge, who is directly related to the original founder of the company, typifies the progressive spirit that pervades the entire organization. It is such progressiveness that has kept "D & O" one of the most respected names in the chemical industry — a name that stands for integrity and high technical proficiency in an extremely complex business.

This new fiber drum, now used by U.S.I. for shipping some of its resin products, has an easy-to-use lever-ring closure which facilitates opening and re-closing.

Tabletting Process Makes Use of Ethanol

The stability of gelatin solutions containing ethyl alcohol increases with the acidity, reaching a maximum at pH 2.5, according to a recently translated German paper. Solutions of gelatin in alcohol, used in making phenacetin and lactose tablets, exhibited binding capacities equal to common gelatins but with a prolonged dissolving time. Decided advantages were found in tabletting ascorbic acid, citric acid, ephedrine-hydrochloride, basic aluminum acetate and iron lactate and tartrate. Alcoholic gelatin was also recommended for the manufacture of absorbing sugar tablets, but for mixtures of sucrose with cocoa, the aqueous solution is preferred.

Gel-Resistant Zeins Yielded by New Process

Present-day methods of extracting zein from corn gluten give a product which, unless specially treated, has a strong tendency to thicken or gel in storage. The reason, according to the inventors of a new process, is that the 80 per cent alcohol solution used extracts undesirable floc-forming proteins along with the zein. Removal of these proteins, as well as unwanted coloring matter and oil, has been both difficult and costly.

The new process is claimed to markedly reduce the extraction of these impurities by the use of a 40 to 65 per cent solution of ethanol and water.

Another feature of the new process is the treatment of the recovered zein to increase its solubility in various solvents with which it is ultimately to be used. This is accomplished by oxidizing the zein in the extract with an agent such as chlorine.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

A new wetting agent, said to leave no surface film or streaks and to require no polishing, is offered for use on glass, porcelain or metal. The penetrating effectiveness of this new detergent is attributed to its action in lowering the surface tension of matter adhering to the surface. **(No. 953)**

USI

To improve adhesion of gummed paper products such as tape, labels and postage stamps, a new additive for the moistening water is offered. It is claimed to produce stronger, more uniform seals, to eliminate curling and to speed the output of sealing machines. **(No. 954)**

USI

A resin adhesive is announced as the first commercial development solely from furane derivatives. The new adhesive is claimed to bond at room temperature, to require no contact pressure and to be completely resistant to water, alcohol and gasoline. **(No. 955)**

USI

Longer-lived pickling baths are promised by the manufacturer of a new acid inhibitor, designed to protect the base metal and confine the action of the acid principally to scale and oxides. **(No. 956)**

USI

Termite control, lasting five years, is promised by a manufacturer who says government reports show his product to be highly effective in the termite control field. **(No. 957**

USI

A new emulsifying agent, described as being non-toxic and edible, is suggested as a replacement for diglycol laurate in the preparation of pharmaceuticals, cosmetics, foodstuffs, and as a shortening base. **(No. 958)**

USI

Fire-extinguishing foam, made from soy beans, is described as being capable of smothering the toughest petroleum and chemical fires. Five gallons of the product are said to produce 900 gallons of smothering foam in a few seconds. **(No. 959)**

USI

Flame-resistant plastics, of cellulose acetate, are announced with the statement that they are heat-and-humidity resistant, tough, colorable and may be molded by the injection process. **(No. 960)**

USI

A fire-retardant coating, bone-white but tintable, for use on wood and other combustible materials, is claimed to offer exceptional coverage. One gallon is said to cover 185 sq. ft. with two coats. **(No. 961)**

USI

Faster varnish production is promised by the processor of a new linseed oil which is claimed to polymerize instantly, thus reducing the cooking time. **(No. 962)**

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Dibutyl Phthalate
Diethyl Phthalate
OTHER ESTERS
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Diethyl Carbonate
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Acetoacet-ortho-anisidide
Acetoacet-ortho-chloranilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloranilide
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Sodium Oxalacetate
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Ethyl Ether
Ethyl Ether Absolute—A.C.S.
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*Curbay Special Liquid
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RESINS
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S&W Congo Gums—raw, fused & esterified
S&W *Aroplaz—alkyds and allied materials
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grained cast iron. The self-contained radial piston pumping unit, powered by a fully-enclosed motor, can be placed on the floor, in any desired location. Automatic, single-cycle operation from a push-button control panel, can be supplied if desired. This system incorporates all adjustments for operation of the machine to the predetermined automatic cycle.

Molding Presses QC 598

The newly designed semi-automatic compression molding presses. These machines may be used for either straight compression molding or by the transfer method, and are available in capacities from 50 to 1200 tons.

For use as a compression molding press, it is equipped with T-slotted platens, top and bottom mechanical ejectors, double-acting ram, electric automatic single-cycle control, and built-in power unit.

When used for transfer molding, using the top cylinder, the transfer pot is incorporated in the top section of the mold. The main ram is used only as the clamping medium, the top cylinder providing the transfer pressure.

The power unit is a radial-piston, short-stroke pump, driven by a motor housed in the base of the machine with the tank.

Rotary Pump QC 599

An improved steam-jacketed swinging-vane type rotary pump for handling sludge and other viscous liquids is announced by Blackmer Pump Co., Grand Rapids, Mich. It is of iron construction, bronze-fitted, has a capacity of 500 GPM at 150 psi, and is powered by a 75 hp gearhead motor at 155 RPM.

Lightweight Aggregate Plant and Fullers' Earth Deposit

at Ellenton, Florida
40 Miles from Tampa

Government-owned; to be Sold by Reconstruction Finance Corporation (A Disposal Agency Designated by Surplus Property Board)

This plant includes the machinery, equipment, railroad facilities, and utilities used to produce lightweight aggregate for concrete.

Comprises 22 structures—buildings, sheds, oil tanks, bins—of varied construction (steel, wood, brick and concrete). Repairs are required. Served by spur line (with sidings) of the Tampa Southern (A. C. L. System) R. R. Frontage of approximately 3900 ft. on the Manatee River (about 6 ft. channel on southerly edge of tract—dredging necessary) with riparian rights; and approximately 5900 ft. on U. S. Highway 41. Inspection by appointment.

•

With the exception of about three acres covered by the plant and roadways, the entire tract of 333 acres contains approximately 300,000 cubic yards of Fullers' earth.

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PLANT OPERATIONS NOTEBOOK

Is This the Right Extinguisher?

As "Mr. Average Employee" is the real fire-fighter in every shop and factory, it's important that he knows which fire extinguisher to use on various types of fires. To help mobilize employee fire-fighting, Randolph Laboratories, Inc., 8 E. Kinzie St., Chicago 11, Ill., has prepared a new *Fire Extinguisher Installation Guide* that illustrates which extinguishers should be used and installed for the different kinds of fires that may break out. Posted over every fire extinguisher in the plant, this 8½ by 20 inch chart attracts the attention of the employees, quickly showing them the correct use for extinguishers.

The Installation Guide divides fires into the standard "A," "B" and "C" classifications, with large illustrations of typical fires in each division. Also pictured are the extinguishers to be used, including carbon dioxide, vaporizing liquid (carbon tetrachloride), soda-acid, foam, and pump tanks.

The Installation Guide is designed for notebook insertion as well as wall-posting and can be filed as quick reference for plant safety departments, fire-fighting schools, and employee demonstrations. Quantity copies are available now, without charge.

Care of Superheaters

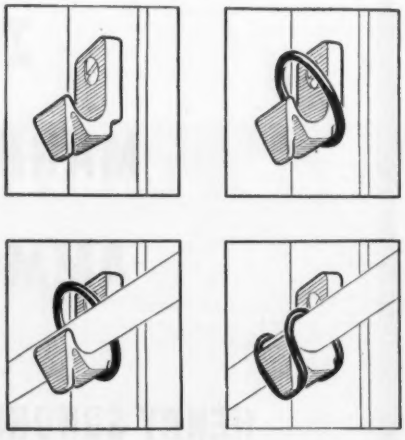
It has been pointed out by one user of steam superheaters that before steam purifiers were installed superheater tubes in his plant were replaced on an average of one per week per boiler. He states that after installation of the purifier not one tube had been replaced in more than one year.

This user also reports that because of the elimination of moisture by the purifier they have 45 degrees F. higher average superheat, increasing turbine efficiency approximately 4%. Also it is reported that previous to the installation of the purifier the superheater was washed out every time the boiler was out of service and it always contained much mud and dirt. Now, when washing out the superheater the water comes out "crystal clear."

Tube Clamp

Development of a new type clamp, particularly adaptable for tube and conduit type installations of all kinds, has been announced by The Glenn L. Martin Company. The clamp is shaped after an inverted lateral "s" and is fastened to the wall or frame with an ordinary screw. The tubing to be fastened is placed in the open side of the curve and the clamping ring passes around the back of the base, over the top of the tubing and down the front where it is hooked under the curve at the front of the "s" to form a simple locking device.

The clamping ring can be made of a high grade synthetic rubber or other elastic material, which also serves as a "shock absorber" in eliminating vibration. If it is damaged, replacement can be accomplished without removing the clamp body.



The clamp proper can be moulded from a fabric base phenol fiber material or fabricated from formed sheet metal in any desired size. If moulded the clamp can be made in color to follow individual piping or conduit systems.

No tools are needed for installation or removal of objects and there are no loose parts to be lost or broken. When the clamps are used in a series, any single tube or conduit can be removed without disturbing the others. The clamp can also be readily adaptable for bonding. Substitution of a fiber-glass clamping ring will provide increased durability.

Though the Martin Company has not started production in large quantities on the clamps at the present time, this work will be undertaken soon either through their own facilities or those of a licensed organization.

Fire Protection for Electrical Apparatus

Electricity, when properly used, is not a fire hazard; but electrical apparatus should be protected by suitable fire-extinguishing equipment for use if accidents occur.

For protecting small open and semi-enclosed rotating units, switches, appliances, and other commonly-used electrical devices, portable vaporizing liquid or carbon dioxide fire extinguishers are useful. As these extinguishers discharge non-conducting extinguishing agents they may be used on live equipment without danger of subjecting the operator to shock, causing short circuits, or damaging the equipment. In addition, they are effective on oil fires in transformers and circuit breakers. For deep-seated fires which resist these extinguishers, water may be used, but not on live apparatus.

At least one large or two small units, bearing the approval of the Underwriters' or Factory Mutual Laboratories, should be placed near each piece of apparatus to be protected. More may be needed for large pieces of equipment, such as motors, generators, and switchboards. They should be mounted where they are readily accessible, but not on the protected apparatus or where they are likely to be cut off by fire.

As the gases given off by burning insulation are poisonous, vaults and other enclosures containing electrical equipment on fire should not be entered without suitable gas masks. When such protection is lacking, it is desirable to stay outside the enclosure in the open air while fighting the fire. If this is not possible, leave the instant the fire is out and do not return until all smoke and odors are gone.

All workers who may have occasion to control electrical fires should be taught how to use the extinguishers and what to do when the emergency arises. Prompt and effective action to insure minimum loss by fire, can be obtained only by training the worker.

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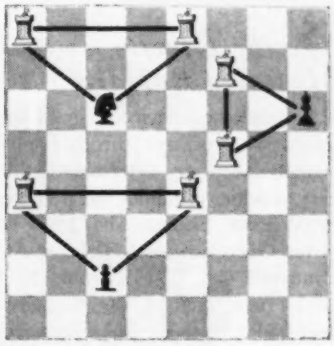

BUT MIGHTY USEFUL FORMULAS

Metal Peroxides by Becco are insoluble in water but soluble in mineral acids. They are compatible with many inorganic and organic materials and can be used in the preparation of tooth powders, in processing of foodstuffs, and, in general, where oxidation at high temperatures is required. Some of these peroxides also find use as chemo-therapeutical agents and for cosmetic and pharmaceutical preparations.

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BECCO SALES CORPORATION
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LABORATORY NOTEBOOK

Ultraviolet Locates Fungi

A new use for ultraviolet rays is revealed by the Hanovia Chemical & Mfg. Company with announcement of Army and Navy contracts for its Inspectolite lamp.

This lamp has been found useful for the location of fungus deposits on material which, after use in the tropics, is frequently impaired in its operating characteristics. When communication apparatus, such as raido transmitter, is brought back for defungicizing and needed repairs, it is impossible for the unaided human eye to locate areas of infection.

Using the black ray lamp, however, makes location of the fungus quick, simple and positive, since it has been determined that the organism will fluoresce and glow brightly when exposed to the filtered ultraviolet rays. When tracked down by the electrical spy the diseased areas are treated with fungicide.

A special dark glass filter provided with the lamp is practically opaque to the visible light generated in the bulb, but transmits the nearly invisible zone of radiation in the ultraviolet, about 3,660 A., the most effective wavelengths to cause fluorescence.

Specific Gravity Measured Rapidly

A simple new device to speed important industrial processes through quick, extremely accurate determination of specific gravities of liquids has been described by William Seaman and J. J. Hugonet of the Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J.

The new method has the advantages over older methods of being very rapid, and of operation by technicians with comparatively little training.

The new measurement device, it was explained, consists of two long, narrow glass tubes placed on either side of a meter rule, joined at the top, and connected to a source of vacuum, while the lower ends dip into two beakers. One beaker contains a reference liquid whose specific gravity already has been determined accurately, and the other holds the liquid under test.

The vacuum is applied slowly until each liquid rises to almost the top of its tube, then the vacuum connection is closed, and the height of each liquid is recorded. The vacuum then is slowly released until the liquids are near the bottom of the meter rule, and another reading of heights is taken.

The specific gravity of the liquid being tested then can be calculated easily by multiplying the known specific gravity of the reference liquid by the drop in height of the reference liquid, and dividing by the drop in the height of the test liquid, giving a specific gravity value accurate in the fourth decimal place.

Laboratory Model Tablet Machine

The "Eureka" tablet compressing machine has been improved in design and strengthened in construction to make it more widely adaptable for research and other laboratory work and for manufacturing industrial specialties where limited production is required.

Improvements include a more efficient feeding device for handling material difficult to feed; the frame has been greatly strengthened; the ejection can is now milled to give smoother action; and an improved adjustment of the lower plunger enables the press to make very small tablets. This redesign makes this little laboratory press highly efficient under continuous power operation.

Applying pressure of 1½ tons, with a maximum die-fill of 7/16" and producing tablets up to ½" diameter at rates up to 100 per minute, this press has hundreds of applications in experimental work, for making test pellets, proving industrial specialties such as chemical products, catalysts, etc., pharmaceuticals, ceramic mixtures such as Steatite, carbon and powder metallurgy tests.

Portable Ion-Exchanger

The Filt-R-Stil, a new development made available by the American Cyanamid and Chemical Corporation transforms ordinary water into the chemical equivalent of distilled water by means of simple filtration using melamine-derived, ion-exchange resins. The bench model illustrated produces eight to ten gallons of mineral free water per hour, while the Filt-R-Stil Lab Unit produces thirty, and larger units produce greater quantities for use in industrial plants where a continuous supply of hundreds or thousands of gallons of mineral-free water may be required.

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INDUSTRY'S BOOKSHELF

Engineering Physics

PRINCIPLES OF PHYSICS I: MECHANICS, HEAT AND SOUND, *Francis Weston Sears.* Addison-Wesley Press, Inc., 1944; 780 pp. Reviewed by Raymond T. Ellickson, Polytechnic Institute of Brooklyn.

THE FIRST COURSE in physics at the Massachusetts Institute of Technology extends through the first and second years, and this book is intended to cover the first year's work. About two-thirds of the book is devoted to mechanics, including the mechanics of fluids, one-fifth to heat, and one-tenth to sound. The treatment of the subject matter is quite orthodox and follows closely the usual order of presentation and choice of content. Except for the first few chapters on statistics the calculus is used freely throughout the book. The English gravitational, the cgs, and the mks systems of units are used where they apply.

As the title implies, the intent of the author is to place emphasis on the basic principles of physics rather than their application to specific problems, and in this he has succeeded very well. The book is clearly written, the typography is good, and the illustrations are clear and well chosen. A novel feature is the extensive use of multiflash photographs to illustrate phenomena in mechanics and sound. Another welcome feature is the introduction of a touch of modern physics, such as the mass-energy relation in the subject of mechanics and the Wilson cloud chamber in the section on humidity, where they properly belong. There is a large, well selected group of problems. Answers to the problems are not given.

There seem to be remarkably few errors or misprints for a first edition. There is one slip on page 4 where the statement is made that "everyone knows by experience that a given force is more effective for moving [a] box the more nearly the direction of the [applied] force approaches the horizontal." This will be a surprise to most physics teachers as well as most porters. The force is most effective, of course, when it is applied at an angle whose tangent is equal to the coefficient of friction between the box and the floor on which it rests. There are many who would not agree with the statement on page 447 that "there is no concept in the whole field of physics which is more difficult to understand than is the concept of entropy." Aside from the questionable validity of the statement, there seems to be no good pedagogical reason to introduce the concept in such a frightening manner.

Professor Sears has made a valuable addition to the list of engineering physics texts. His book should find a wide adoption.

Flavors and Odors Discussed

FLAVOR, Ernest C. Croker. McGraw-Hill Book Co., New York, 1945; 172 pages, $2.50. Reviewed by Robert W. Towne, Monsanto Chemical Co.

TO EVERYONE who is interested in flavors and odors, whether they are professionals or amateurs, this book will be of interest; since, it is probably the first book to cover thoroughly the theoretical and practical aspects of flavor.

The early chapters set forth the elements of flavor, the physiology of flavor perception the psychology of flavor and the terms used to describe flavors in general. A numerical system of designating both the type and intensity of odors is given. The tables of classification of odoriferous substances which are arranged according to their volatility in groups, can be very useful.

There are many problems that arise when dealing with flavors and odors. The author has touched upon the most important industries, such as beverage, food and dairy, where these arise. Since all problems cannot be foreseen, broad principles of what to do and what not to do are set forth briefly.

The "real meat" of the book, to many readers, will probably be the chapter on organoleptic technique. Considerable effort has been spent to go into details to describe the procedures and precautions that must be followed to obtain accurate, reproducible results in evaluating both odors and flavors. In addition, the common pitfalls encountered are set forth.

The author is to be commended for writing a technical book that, in addition to being highly informative, is also interesting reading.

Chemical Guidebook 20th Edition

BUYERS GUIDEBOOK NUMBER of Chemical Industries, The MacLean-Hunter Publishing Corp., New York, 1944; 906 pp. $2.00.

THE 20TH ANNUAL revision of the Buyers Guidebook number of Chemical Industries contains up-to-date descriptive information and sources of supply for chemicals, equipment and containers, raw materials and specialties. Also included are directories of chemical companies, and equipment and container companies, an index, trade name dictionary and sections on technical data, chemical prices, associations and societies, and professional services.

Physicochemical Measuring

EBULLIOMETRIC MEASUREMENTS, *W. Swietoslawski.* Reinhold Publishing Corp., New York, 1945; 228 pp., $4.00.

AN ENGLISH edition of "Ebullimetry" was published in 1936, and since that time a photo-lithotype and several supplements have appeared. The author has now rewritten the book, adapting it to the American reader, and, in so doing, he has been able to include the results of recent relevant work.

The purpose of the book is to make available to academic and industrial research men alike a comprehensive description of the ebullimetric method for measuring the boiling and the condensation temperatures of liquids and solutions. These measurements have found wide application in ascertaining the degree of purity of liquid substances, in examining azeotropic phenomena of binary and ternary mixtures, in molecular weight determinations, in microanalyses of impurities, in studying thermal resistivity, in tonometry, and in analytical control.

The book is very thorough and detailed in the descriptions of apparatus and methods. This is particularly important owing to the fact that the original literature to which liberal reference is made, is published to a large extent in relatively unavailable Polish and Russian journals.

New Digest Service

RESINS—RUBBERS—PLASTICS, Patent Digest Service, Volume I, Issue 1, *H. Mark, Scientific Editor.;* Interscience Publishers, Inc., New York. $45 per year.

In looseleaf form the Patent Digest Service supplements the literature service by the same publishers and is designed to create a complete patent file. The subject matter consists of new developments in manufacture and applications of resins, rubbers, and plastics, and it is the stated policy of the editors to cover all American patent literature and a selective list of the foreign patent literature, as well as to give a fairly complete coverage of the industrial applications of these materials. In their reviews, the editors have rewritten the patent statements into a clear and readable form while still giving all essential data.

In addition to the usual data required to note a given patent, such as patent number, class number, and types of claims, the abstract is divided into four parts entitled utility, prior art, novel art, and one or more representative claims. Well written abstracts of this type will be of the greatest assistance to anyone working in this now complex field.

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BOOKLETS & CATALOGS

Chemicals

A799. AROMATICS. Price list and catalog for these chemicals is available from Magnus, Mabee and Reynard, Inc.

A800. CARBON BLACK. A 126-page book, covering the subject of carbon black in all phases, statistics, type produced, review of manufacturing processes, use in GRS, and an index of patents and rubber grade blacks are noted in a booklet issued by the United Carbon Co.

A801. CERIUM. Two lists of references to the use of cerium as an alloying agent in conjunction with aluminum and magnesium are available from the Cerium Metals Corp.

A802. CLEANERS. The Klem Chemical Works has issued an 8-page booklet covering cleaning, derusting, phosphatizing, soldering and maintenance processes.

A803. FIBER GLASS. An 8-page booklet of the Owens-Corning Fiberglas Corp. describes many uses to which this new fiber has been applied.

A804. INSULATING BRICK. Installation data and pictures of equipment using fire insulating brick are included in a 14-page booklet of the Harbison-Walker Refractories Co.

A805. 2-METHYL-2,4-PENTANEDIOL titles an 8-page booklet giving suggested industrial applications and technical data for use of this material. Commercial Solvents Corp.

A806. OPTICAL GLASS. A 56-page booklet, "Seeing It Through," describing its part in the war effort, has been issued by the Bausch and Lomb Optical Company.

A807. PROTECTIVE COATINGS. A 6-page broadside on Koroseal Tape RX and MX, and Korolac RX, protective coatings for plating and masking work is available from the B. F. Goodrich Co.

A808. WAX. Tropicalized wax (fungus resistant) is the subject of a 6-page folder of Zophar Mills, Inc.

A809. WOOD PRODUCTS. The Timber Engineering Co. has issued a 32-page brochure describing such diverse wood products as plastics, sawdust, and alcohol.

Equipment—Methods

F371. ABRASER. A 16-page abraser testing handbook is available from the Taber Instrument Corp.

F372. ADJUSTING MACHINE. The Walter Stock Adjusting Machine for the lengthening, straightening or shortening of metallic parts is the subject of an 8-page booklet of the Watson-Stillman Co.

F373. AGITATOR. The Weldco jet for circulating and agitating solutions in tanks is described in a folder of the Youngstown Welding and Engineering Company.

F374. COMBUSTION FURNACE. The Glotemp Combustion Furnace, recommended for carbon analysis in steels, is the subject of a leaflet of the Harry W. Dietert Co.

F375. CONVEYOR. The New Sidekor Karrier for handling materials in a horizontal plane is the subject of a 4-page bulletin of the Link Belt Co.

F376. COOLING UNIT. The new Fin-Fan Unit, developed in cooperation with the Griscom-Russell Co., is described in a 4-page booklet of the Fluor Corp.

F377. CORROSION. Technical information discussing corrosion in unit heaters is contained in a 12-page booklet of the D. J. Murray Manufacturing Co.

F378. ELECTRICAL EQUIPMENT. A 36-page catalog listing various types of electrical equipment, has been issued by Walker-Jimieson, Inc.

F379. ELECTRONIC HEATERS. A 4-page bulletin of the Allis-Chalmers Manufacturing Co. describes their electronic heaters for induction and dielectric heating.

F380. EXPLOSION PROOF EQUIPMENT. The use of explosion proof equipment is described in a 26-page booklet of General Electric Co., "How to Apply Explosion Proof Equipment."

F381. FILTER. Filtration for the chemical, food, fermentation, and processing industries is the subject of an 8-page booklet of the Niagara Filter Corp.

F382. GREASE INTERCEPTOR. A manual designed to provide information required for the proper selection and use of grease interceptors, is available from the Josam Manufacturing Company.

F383. HEAT EXCHANGER. The new Alco heat exchanger, utilizing air as the cooling media, is described in a 4-page folder of the Alco Products Division of the American Locomotive Company.

F384. HEAT EXCHANGERS. Pictures, drawings, and specifications of heat exchangers are the principal subject of a 16-page booklet of the Alco Products Division of the American Locomotive Co.

F385. MAGNETS. "Sintered-Alnico Magnets" titles a 20-page booklet, DEA-3682-B, available from the General Electric Co.

F386. MIXERS. A short description of the various applications of "Turbo-Mixers" is given in a 4-page booklet of the General American Transportation Co.

F387. MIXERS. Batch mixers with beaters, whips, and agitators are described in a leaflet issued by the Reynolds Electric Company.

F388. MOLDING PRESSES. Two bulletins, No. 642-A, "Angle Molding Presses," and 640-A, "Semi-Automatic Compression Molding Presses," have been issued by the Watson-Stillman Co.

F389. OILLESS BEARING. The performance of the grade D-10 low-friction oilless bearing material under abnormal operating conditions is the subject of a 4-page booklet of the Keystone Carbon Co.

F390. PIPE OUTLETS A 32-page handbook illustrates and explains the four simple steps in installing pipe outlets by the Weldolet method. The tools required to make the joint are illustrated. Bonney Forge and Tool Works.

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F392. PUMPS. Fairbanks, Morse and Co. has issued two folders describing their "Oil Lubricated Turbine Pump" and the "Fairbanks Morse Niagara Propeller Pumps."

F393. PUMPS. Single suction pedestal type centrifugal pumps for use where close-coupled motors are not practical are the subject of a bulletin of the Allis-Chalmers Manufacturing Company.

F394. RADIATORS. Cast iron fin type radiators are discussed in a 6-page folder of the D. J. Murray Manufacturing Company.

F395. REFRIGERATION COMPRESSORS. Four separate folders, each listing approximate dimensions, specifications, and pictures of the major parts of the different sizes of the vertical, type VSA refrigeration compressor have been issued by the Worthington Pump and Machinery Corporation.

F396. ROTARY DRYERS. "Louisville Rotary Dryers" titles a 6-page folder of the General American Transportation Corporation.

F397. ROTARY DRYERS. "Louisville Steam-Tube Rotary Dryers" titles an 8-page booklet of the General American Transportation Corp.

F398. RUBBER GOODS. Over one hundred items, such as rubber clothing, tubing, and other miscellaneous items, are listed in a pocket size, 34-page catalog of the Miller Products Company.

F399. SAFETY CLAMPS. Many applications of Punch-Lok safety clamps are noted in a 4-page folder issued by the B. F. Goodrich Company.

F400. SAFETY EQUIPMENT. The industrial Safety Equipment of the Stewart R. Browne Manufacturing Co. is pictured and described in a 24-page catalog.

F401. SETTLING EQUIPMENT is described and pictured in a 4-page bulletin recently published by the Claude B. Schneible Company.

F402. SHIPPING CONTAINERS. Various types of shipping containers, particularly corrugated containers, are described in a new issue of "The General Box." General Box Co.

F403. SOLENOID VALVES. Asco Solenoid Valves of the Automatic Switch Co. for the automatic and remote control of the flow of liquids and gases are described in a 12-page booklet.

F404. SPECTROMETER. An 8-page booklet of the North American Phillips Co. discusses the "Geiger-Counter Spectrometer for Industrial Research."

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F407. TACHOMETERS. Descriptions, construction data and pictures of the various types of electrical tachometers available from the General Electric Co. are noted in a 12-page booklet, GEA-4324.

F408. TEMPERATURE CONTROL CABINETS of the Precision-Freas type are described in a 48-page illustrated booklet, No. 325, issued by Precision Scientific Company.

F409. TIMERS. A 4-page bulletin of the C. H. Stoelting Company describes the various types of electric timers which they produce.

F410. TUBING made up of different external and internal contact surfaces is discussed in an 8-page booklet of the Bridgeport Brass Company.

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F414. VALVES. A completely new revised catalog has been issued by the Merco Nordstrom Valve Company. This replaces all previous editions of the catalog and valve bulletins. The 134 pages contain valve listings and specifications, engineering tables, and lubricant data, as well as various engineering tables.

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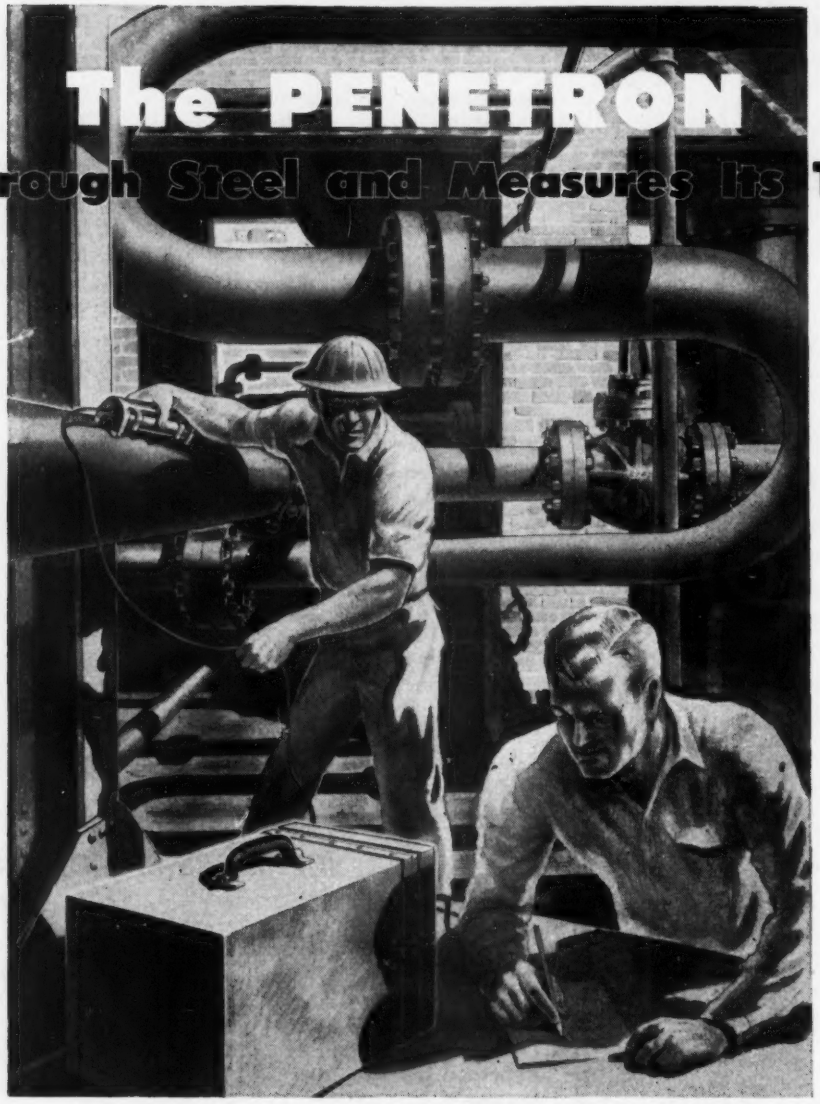

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NEWS OF THE MONTH

Standard-I. G. Patents Decision Delayed

The Standard Oil Co. of N. J., who has been accused in Federal Court of pooling patents with I. G. Farben to create a world-wide partnership, has rested its case, as has the United States government, in the civil trial in which the company sought recovery of 2,500 patents seized by the Alien Property Custodian in 1942 and 1944 because of alleged German interest. The trial which lasted three weeks, was before Federal Judge Charles E. Wyzanski, Jr., of Boston, sitting without a jury. The patents relate to oil processing improvement and hydrogenation.

The court has fixed August 1 for the submission of briefs and September 1 for the filing of reply briefs. Judge Wyzanski has indicated that his decision may not be reached for almost a year.

The company contended the patents were purchased from I. G. Farbenindustrie, A. G., for $35 million worth of Standard Oil securities and that no German interest in the patent rights remained after 1939. The Government contended that the transfer of patents from I. G. was a transfer in form only.

Niacet Chemicals Becomes U. S. Vanadium Division

Announcement has been made by J. R. Van Fleet, president of United States Vanadium Corp., a Unit of Union Carbide and Carbon Corp., of the formation as of May 5th, 1945, of the Niacet Chemicals Division of the United States Vanadium Corporation.

This new Division will manufacture and market products formerly made and sold by Niacet Chemicals Corporation, principally glacial acetic acid and vinyl acetates.

The local plant and sales organizations of Niacet in Niagara Falls will be continued. The new sales offices of the Niacet Chemicals Division will be located at 910 Niagara Building, Niagara Falls, New York.

Market Research Association Formed

The Chemical Market Research Group, which has operated for the last six years as an informal organization of chemical market research executives and chemical market economists, held its annual business meeting at the Biltmore Hotel, New York, on June 8, and formally organized as The Chemical Market Research Association.

The original group was started in 1939 as an informal discussion group when it was apparent that market research was becoming increasingly important to the chemical industry. Membership of the group grew to such an extent that formal organization as a semi-professional association became necessary.

The officers of the association elected to serve for the coming year are: president, James G. Park; vice-president, Richard L. Davies; treasurer, William M. Dennis; recording secretary, Richard Lawrence; corresponding secretary, Frank M. Waldo; councilor-at-large, George Gollop and James H. Boyd, and program committee chairman, Wm. H. Bowman.

Broderson Heads SPI

Neil O. Broderson, head of the Rochester Button Co., has been elected president of the Society of the Plastics Industry, Inc., succeeding George K. Scribner of the Boonton Molding Co., who now becomes SPI board chairman.

Concannon To Make Chemical Survey For Peru

Charles C. Concannon, chief of the chemical division of the U. S. Department of Commerce, has left Washington for Peru, where he will conduct a study of chemical possibilities in that country, similar to the survey he made of Chile's chemical industry resources during the first part of 1944. It is expected that the trip will take approximately four months.

While in Peru, Dr. Concannon will be on loan from the United States Government, and will be connected primarily with the Santa Corporation, an organization of the Peruvian government which has been established to bring about the development of new industries in the Santa River valley area. While no official announcement has been made, it has been termed probable in some circles that Dr. Concannon will go to China after completing the Peruvian survey, to study the chemical possibilities of that country.

Scientists Fly to Soviet Function

American scientists left New York in the beginning of June in a Soviet plane to attend a celebration in Moscow marking the 220th anniversary of the founding of the Russian Academy of Sciences. The party included: Dr. Detlev W. Bronk, biologist, of the University of Pennsylvania, representing the National Academy of Sciences; Dr. Duncan A. MacInnes, physical chemist, representing the Rockefeller Institute; Dr. Harlow Shapley, astronomer, representing Harvard University; Dr. Henry Field, anthropologist, of the Library of Congress; Dr. James W. McBain, chemist, of Stanford University; Dr. Irving Langmuir, chemist, of the General Electric Company; Dr. Charles Kellogg, soil scientist, of the Department of Agriculture; Edwin Smith of the National Council of American Soviet Friendship, and Dr. Isaac M. Kolthoff, analytical chemist, of the University of Minnesota; Dr. E. U. Condon, associate director of the research laboratories of Westinghouse Electric Corp., and Dr. A. Nadai of the same company.

Perkins to Advise F.E.A. in London

Enoch Perkins, vice-president of Mutual Chemical Co. of America, has been appointed technical consultant on chrome ore for the Foreign Economic Administration. He has served as manager of the Mutual New Caledonia chrome ore mines since 192

McKesson & Robbins Advance Lipscomb and Hildebrandt

Charles T. Lipscomb, Jr., vice-president, who has been in charge of the Industrial Chemicals Division of McKesson & Robbins, Inc., has been chosen for the new post of assistant general sales manager. His past duties have been taken over by F. Dean Hildebrandt, formerly a partner in Hildebrandt & Co., who has been made a vice-president.

Snelling Named to Allied Control Board

W. O. Snelling, consulting chemical engineer of Allentown, Pa., has been appointed a member of the Allied Control Council. Dr. Snelling, an authority on explosives, is one of a group of experts, both Army and civilian, who have been chosen to help carry out the policies of United States and Allied authorities in controlling Germany's economy. Supreme Headquarters said the economic intelligence division would make sure that "Germany's war-making powers are eliminated in such a way they cannot be revived in secret preparations for another war."

R. J. Wysor, until recently president of the Republic Steel Corp., will supervise metallurgical operations in Germany. Other members of the Reich control group include: Calvin B. Hoover, dean of the Duke University graduate school, who will head the intelligence group and be special adviser to Brig. Gen. William H. Draper, chief of the economic division; Edward S. Zdunek, formerly head of General Motors at Antwerp, supervising the engineering section; Philip Gaethke of New York, formerly with Anaconda Copper, to direct all mining operations in the United States occupation zone; and Philip P. Clover of Socony Vacuum, as chief of the oil section of the fuel and mining branch. The group also includes the following: Laird Bell, chief counsel for the economic division; Lloyd Steers, former agricultural attache for the United States Embassy in Berlin, to be special adviser to General Draper on food and agriculture; Col. James Boyd, of the Colorado School of Mines, to be chief of a branch to control industrial production; Peter Hoglund, on leave from General Motors, to serve as Colonel Boyd's deputy; and Col. Maurice R. Scharff, former assistant director of the production division of the Army Service Forces, to head the requirements and allocations branch and to pass on raw material and components permitted the Germans.

Chemical Industry Spends Little on Reconversion

Applications for bottleneck items of equipment and construction for preliminary reconversion, on which preference ratings have been authorized, totaled 260 during the period April 1 through May 26 and represented a dollar value of $115,502,000.

Of these, only two were from the chemical industry and allied industries, and they represented a value of $175,000. The automotive industry accounted for 93 per cent of the value of the applications.

Reports By Air Mail

A new service to chemical and textile producers outside of the United States, consisting of a fortnightly air mail report covering American technical developments in those fields, is being inaugurated by the Universal Trade Press Syndicate, 724 Fifth Avenue, New York 19, N. Y. The service includes a continuous bibliography of important articles and news. Distribution of the service in South America has been assigned to Five Continents Publications.

National Committee Studies Industrial Training

Appointment of a National Advisory Committee to study and advise on techniques of measuring results of training used by industries and training agencies has been made known by Paul V. McNutt, chairman of the War Manpower Commission.

The membership of the committee, which will report to WMC's Bureau of Training, is as follows: T. G. Newton, supervisor of training, Armstrong Cork Co., Lancaster, Pa.; Dr. J. O. Christianson, director of agricultural short courses, University of Minnesota, St. Paul, Minn.; William V. Damerson, representative of the International Association of Machinists (A.F.L.), Washington, D. C.; Mrs. Bernice Hubbard May, coordinator of women's training, University of California, Berkeley, Calif.; C. I. Gooch, assistant to the works manager, Boeing Aircraft Corp., Wichita, Kan.; C. T. Schrage, employment engineer, New York Telephone Co., New York City, N. Y. The committee will seek to correlate all available information concerning techniques of measuring training results in order to discover the most practical and effective means of establishing the benefits of organized training in industrial plants.

Chemical Export Policy Criticized

Difficulties in obtaining export licenses have made it virtually impossible for exporters to book any sizable business, it has been reported recently. Much criticism of this policy has been voiced, particularly in view of the fact that Great Britain does not require export licenses for shipment to Brazil.

It is feared that failure to supply urgent needs in South America at the present time will mean that those buyers will obtain goods in the future from those countries which are willing to supply present requirements.

Du Pont Seeks Cellophane Plant Expansion

E. I. du Pont de Nemours & Company has made application to the War Production Board for a major expansion at the cellophane plant in Clinton, Iowa. The expansion program, if approved by WPB, would require about a year to complete.

While a substantial part of the production of cellophane has been allocated to the war effort and it is indicated that war uses will continue to consume a major share of the output until the end of the Japanese campaign, the Du Pont Company is planning for greater post-war production capacity to meet anticipated demands for transparent packaging.

Celanese Established Engineering Fellowship

Celanese Corporation of America has established at Princeton University the Celanese Corporation Fellowship in Chemical Engineering. The fellowship is for a term of five years from the time of the appointment of the first recipient.

INDUSTRY ADVISORY COMMITTEES

Two IAC's Formed

The Office of Industry Advisory Committees of the War Production Board announced that three Aluminum and Magnesium Division industry advisory committees were dissolved. They further announced that two new committees, the Household Insecticide Spray Gun and the Urea and Melamine Aldehyde Coating Resins Industry Advisory Committees, were formed.

S. Gordon Starr of WPB's Consumers Durable Goods Division is the government presiding officer of the spray gun manufacturers' advisory group.

Gerould D. Allyn of the Chemicals Bureau presided over the first meeting of Government representatives and coating resin makers. Production of coating resins has decreased and is insufficient to meet military and essential civilian needs, WPB said. An additional reason for forming the new committee is the reconversion program calling for urea and melamine aldehyde resins in the production of enamel coatings for refrigerators, washing machines and stoves. Planned civilian production of such items will be seriously impeded if such resins are not available, WPB said.

The dissolved committees are the Air Cooled Radial Type Aluminum Cylinder Head Castings, Rolls Royce Merlin Aluminum Casting and Rolls Royce Prime Contractors Aluminum Castings Industry Advisory Committees.

The Office of Industry Advisory Committees reported that 784 groups are currently cooperating with the war agency.

Rubber Accelerator IAC Formed

Requirements for various types of accelerators and anti-oxidants, substitution possibilities and the availability of raw materials were discussed at the recent meeting of the newly formed Rubber Accelerator and Anti-Oxidant Industry Advisory Committee.

Additional production of accelerators and anti-oxidants will be necessary this year to meet the expanded rubber program, the committee was told.

Representatives of the Rubber Bureau said that they are working with the rubber industry on a statistical survey of the supply and requirements for the remainder of 1945 and the first half of 1946.

Representatives of the Rubber Bureau pointed out that there is a distinct trend away from the use of a mixture of synthetic and natural rubber and a shift towards a totally synthetic compound. This trend would affect future requirements for rubber chemicals, and such a change will be reflected in the current supply and requirements survey now being made.

The members of the newly formed committee are:- R. E. Casey, general sales manager, U. S. Rubber Co., Naugatuck Chemical Division; Dr. H. I. Cramer, director, Rubber Chemical Development, Sharples Chemicals, Inc.; W. C. Harmon, Jr., sales manager, Calco Chemical Division, American Cyanamid Co.; O. M. Hyden, assistant manager, Rubber Chemicals Division, E. I. du Pont de Nemours & Co.; B. W. Henderson, manager, Rubber Chemicals Division, American Cyanamid and Chemical Corp.; J. P. Maider, manager, Chemical Production, Goodyear Tire & Rubber Co.; Dr. H. A. Morton, president, Chemico, Inc.; W. S. Richardson, president, B. F. Goodrich Chemical Co.; and Dr. R. L. Sibley, general manager, Rubber Chemicals Division, Monsanto Chemical Co.

L. A. Schlueter, of WPB's Chemicals Bureau, was Government presiding officer of the group. The committee's recommendations will be coordinated with the programs of WPB's Rubber Bureau and the Rubber Reserve Company, a subsidiary of the Reconstruction Finance Corporation.

Marine Paint Materials Easier

Except for a few of the most critical materials, the availability of raw materials for marine paints produced for the War Shipping Administration, Navy and the United States Maritime Commission is expected to ease considerably in the near future, War Production Board officials told the members of the Marine Paint Manufacturers Industry Advisory Committee at a recent meeting.

Although military cutbacks in antimony oxide requirements have been made, greater quantities of antimony metal are required by the military and, consequently, less of the oxide will be produced, WPB told the committee. The committee pointed out that present procedure in allocating small quantities of antimony oxide to specified contracts handicaps the industry. It recommended instead that allocations of the chemical be handled on the same basis as allocations of other raw materials —monthly allotments, for example, to let manufacturers have a small quantity of stocks on hand.

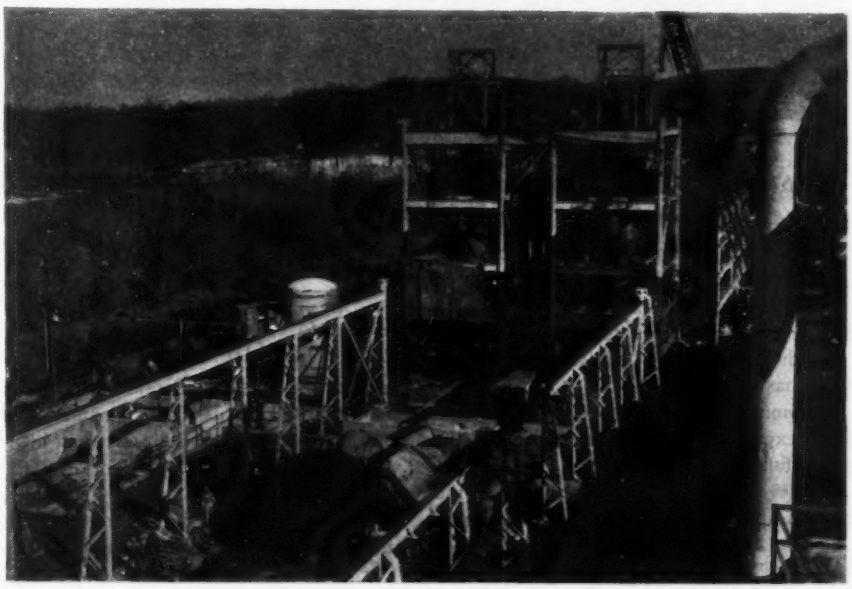
With the exception of lead and chrome pigments, the general pigment situation of the industry is expected to improve.

Chemical colors have become increasingly more difficult to obtain, the committee said. WPB explained that delays in shipments of iron oxide are due to manpower shortages. Over-all supplies of cuprous oxide are expected to improve considerably during the next few months. Mercuric oxide supplies are in balance with demands, they added, and industry should have no difficulty in obtaining adequate supplies for anti-fouling paints.

Coating Resins Demand Up

Increasing military and civilian reconversion requirements for urea and melamine aldehyde coating resins were discussed at the recent meeting of the newly-

Another Step in TVA Fertilizer Program



The Tennessee Valley Authority's new fused phosphate plant at Godwin, Tenn., about 5 miles from Columbia, began initial operations in June. It will be used for experimental large-scale manufacture of fused tricalcium phosphate, an end product which is used both as a plant food and as a supplement to animal feed.

South Gate from the east will be given

chemicals, oils and specialties, and will

organized E. P. Lambert Co. as a sales

formed Urea and Melamine Aldehyde Coating Resins Industry Advisory Committee.

The problem of increased production capacity has become greater in recent months because of the inability of the industry to meet all military and essential civilian needs, WPB told the commitee.

The committee indicated that additional production of the resins would be possible if some changes were made in existing facilities, and if more manpower were made available. WPB officials agreed to consider both of these problems in an effort to increase production of the urea and melamine aldehyde coatings resins.

The members of the committee are:

Dr. H. C. Cheetham, Resinous Products and Chemical Co.; Dr. Horace H. Hopkins, E. I. duPont de Nemours and Co.; W. T. MacAdam, American Cyanamid and Chemical Corp.; C. J. O'Connor, Reichhold Chemicals, Inc.; Bernard W. Slater, Plaskon Division, Libbey-Owens Ford Glass Co.; F. A. Abbiati, Monsanto Chemical Co.

Textile Distribution For Coated Fabrics

The proposed method of distribution of textiles by the Chemicals Bureau to the coated textile industry was discussed at the recent meeting of the Pyroxylin and Vinyl Coated Fabric Industry Advisory Committee.

WPB officials explained that the proposed change in distribution of textiles to the coated fabrics industry would be accomplished by means of a directive to Order M-317-a (Cotton Fabric Preference Ratings and Restrictions). Formerly the textiles for coated fabrics were allocated through the Textile, Clothing and Leather Bureau under M-317-a. In accordance with the proposed directive all requests for fabrics, except for fabrics to be rubber-coated, may be made to the Chemicals Bureau by coaters who own and operate coating machines.

Superphosphate Capacity Investigation Recommended

The superphosphate industry is willing to expand facilities for the production of both superphosphate and sulfuric acid to meet requirements, the Superphosphate Producers Industry Advisory Committee emphasized recently.

Committee members pointed out that this expansion could be accomplished without financial aid from the Government. However, priority assistance for the necessary construction would be essential.

The total annual capacity for the industry, according to WPB, is approximately 9,100,000 tons. However, annual quotas set up this year, based on existing limiting factors such as manpower and sulfuric acid supplies, totaled 7,850,000 tons.

Gage and Vincent Hold Mathieson Alkali Technical Posts

R. E. Gage, left, and G. P. Vincent have been appointed technical advisor and technical director, respectively, for Mathieson Alkali Works. Mr. Gage, who has been with the company since 1916, was formerly director of research and development. Dr. Vincent previously was manager of the sales development and technical service department.

COMPANIES

Va.-Carolina Chemical Acquires Phosphate Mining

The Virginia-Carolina Chemical Corporation has acquired 99½ per cent of the issued and outstanding stock and all the outstanding debentures of the Phosphate Mining Corporation for $2,845,048, A. Lynn Ivey, vice-president, has disclosed. The Phosphate Mining Corporation is engaged in the mining of phosphate rock and the processing of phosphate derivatives in Florida.

Stauffer Takes Over Plant in Nevada

Stauffer Chemical Company has taken over the operations of the Chlorine-Caustic Soda plant which is part of Basic Magnesium, Inc. at Las Vegas, Nevada.

The plant, which has been supplying the magnesium unit with chlorine, will continue chlorine production for industry, now that the magnesium metal manufacturing has ceased.

U. S. I. Acquires Essential Oil Company

Glenn L. Haskell, President of U. S. Industrial Chemicals, Inc., has announced that, on June 1, 1945, the assets and business of Dodge & Olcott Company, the country's oldest essential oil company, would be merged with those of U. S. I. In discussing plans for the future of the new subsidiary, Mr. Haskell emphasized that Dodge & Olcott would continue to operate as a separate entity under the Dodge & Olcott name and would retain its present management, headed by Francis T. Dodge, president, and Charles E. Myers and V. H. Fisher, vice-presidents. No changes are contemplated in the organization.

Atlas Plans Research Facilities

An appropriation of $400,000.00 for the construction of new units to expand the Wilmington research facilities of Atlas Powder Company was approved by the Board of Directors of that company at a meeting June 6, M. J. Creighton, General Manager of the Industrial Chemicals Department, has announced.

Application will be made at once to the War Production Board, and construction of the new facilities which will be designed for process development on a semi-work scale, will go ahead as soon as approval is received.

Kenneth R. Brown is Director of the Research Department.

Rohm & Haas Sell Plexiglas Plant

An announcement of the sale of the South Gate, California, Plexiglas fabricating plant to Shellmar Products Corporation of Mount Vernon, Ohio, has been made public by the Rohm & Haas Company of Philadelphia.

The sale of the South Gate plant, officials stated, is in keeping with the established policy of withdrawing from commercial fabrication of Plexiglas except insofar as is necessary for the development of improved processes. This work will be carried on at the Bristol, Pa., plant of the company.

Effective with the transfer, all Rohm & Haas fabricating orders for the West Coast will be transferred directly to Shellmar. Rohm & Haas officials announced that employees transferred to

South Gate from the east will be given an opportunity to return. At the same time, Shellmar pointed out they will continue to operate the South Gate plant as a Plexiglas fabricating unit until military orders are completed and the plant can be converted to their postwar packaging business, providing permanent employment for a large number of the present personnel.

CALENDAR *of* EVENTS

Scheduled

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. Food and Nutrition Section. Gibson Island Conference. July 16 to 20.

NEW ENGLAND ASSOCIATION OF CHEMISTRY TEACHERS, Massachusetts State College, Amherst, Mass. August 9 to 13. Seventh annual conference.

OPTICAL SOCIETY OF AMERICA, Hotel Pennsylvania, New York, N. Y. October 18 to 20. 30th annual meeting.

Canceled

AMERICAN PHARMACEUTICAL ASSOCIATION has canceled its annual meeting, scheduled for the week of September 10.

Diamond-Harshaw Company Formed

The Diamond Alkali Co. and the Harshaw Chemical Co. have organized an affiliate which will be known as the Diamond-Harshaw Co. This company has been formed for the purpose of offering expanded research services and manufacturing facilities for the production of preformed catalysts, either pelleted or extruded, as used by the petroleum and allied industries.

The Harshaw Chemical Co. has been engaged in this field for several years past and will act as the sales agent for the new company. The research and manufacturing facilities of the Diamond Alkali Co. and the Harshaw Chemical Company will be available to the Diamond-Harshaw Company.

Mutual Building New Bichromate Plant

The War Production Board has awarded to Mutual Chemical Company of America a project for building a new bichromate of soda plant at Lake Charles, Louisiana. The plant is being built and will be operated by Mutual for account of Defense Plant Corporation and should be in production the early part of 1946.

Design work has advanced to a point where the contractors are now ready to start the construction and the adaptation of existing facilities now owned by DPC.

Hommel Creates Chemical Division

The O. Hommel Company of Pittsburgh, Pa., has organized a chemical and equipment division.

James F. McCrory will act as head and will be assisted by Charles F. McGovern.

This new division will act as sales agents for principal manufacturers of chemicals, oils and specialties, and will represent builders' equipment.

Rae Engineering To Make Chemicals

Rae Engineering Co. of Woodbridge, N. J., has announced that it is entering the field of manufacture of rare and laboratory chemicals "not easily available from laboratory supply houses." Some of these will be kept in stock, while others will be made to order.

The firm has previously been engaged in engineering and chemical research, and will continue these activities along with its manufacturing work.

Neville Appoints Midwestern Rubber Representative

The Neville Company, Pittsburgh, Pa., announces appointment of the newly-organized E. P. Lambert Co. as a sales representative.

The new company, with offices at First Central Tower, Akron 8, Ohio, has been formed by E. P. Lambert, for many years manager of the Akron office of Charles T. Wilson Co., Inc.

Buffalo-Electro-Chemical Expands

The Buffalo-Electro-Chemical Co., Inc., Tonawanda, N. Y., has embarked on an expansion program which will cost between $1,300,000 and $1,400,000 and will increase production approximately 60 per cent from present levels, president Charles A. Buerk has revealed.

The program, expected to be completed by January 1, calls for the erection of an addition to the plant costing more than $400,000, with the rest of the outlay for new equipment and machinery.

FLORANOL

A single chemical used in compounding Rose Odors.
Blends with or replaces Phenyl Ethyl Alcohol.

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The Accepted Basis for Floral Perfumes
(Lily of the Valley, Lilac, etc.)

A single chemical having properties most desired by perfumers.

GREAT STRENGTH
(5 times stronger than Hydroxy Citronellal with which it blends well.)
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PURE OILS DISTILLED ESPECIALLY FOR US.
Exceptionally Fine Quality

OIL OF SPRUCE
OIL OF CEDAR LEAF AMERICAN PURE
OIL OF BALSAM FIR AMERICAN
OIL OF PINE NEEDLES AMERICAN

They come to you as they come from the still in state of absolute purity. Samples will convince you of the added value to be had from these Pure Quality Oils.

ALDEHYDES

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Company Notes

W. DONALD CONKLING AGRICULTURAL RESEARCH LABORATORY of Mount Dora, Florida, has acquired the Borinquen Research Laboratory of Eustia, Florida.

SMITHMORE CHEMICALS, INC. has recently been founded for the production of ester and ester ether plasticizers. Offices are in Worcester, Mass., and the plant is in Easthampton, Mass. The president and treasurer are A. F. Smith and Manuel Morse, respectively.

THE FREDERICK STEARNS & Co., Division, Sterling Drug, Inc., has this year financed a total of 17 research grants and fellowships at outstanding universities and hospitals. Supervising this work is Melville Sahyun, vice-president in charge of research.

NEWS *of* SUPPLIERS

THE CLARK MANUFACTURING CO. of Cleveland, Ohio, in the past has marketed steam specialties and fluid controls under the name of "Strong Steam Specialties." From now on the products will be sold as "Clark Fluid Controls."

OLIVER UNITED FILTERS, INC., New York, Chicago and Oakland, California, announces the appointment of Leon D. Thompson as export sales manager. Mr. Thompson, is located at 33 West 42nd Street, New York 18, N. Y. He has been with the company as a technical filtration engineer for more than twenty-five years.

Gwilym A. Price has been appointed executive vice-president of the **WESTINGHOUSE ELECTRIC CORP.**, according to an announcement by George H. Bucher, president.

Mr. Price was elected vice-president of the company in September, 1943, and was elected to the board of directors in January of this year. His responsibilities had included settlement of the company's war contracts.

Mr. R. P. Tyler, General Sales Manager of **MACWHYTE COMPANY**, has appointed Mr. Fred M. Sime as District Sales Manager for the Pacific Southwest and Mr. Wm. J. Brett, District Sales Manager for the Pacific Northwest. Mr. Fred M. Sime is located at Macwhyte Company's San Francisco office, 749 Bryant Street. Mr. Wm. J. Brett is located at the company's Portland (Oregon) office, 1603 N. W. 14th Avenue.

THE BRIGGS CLARIFIER COMPANY, of Washington, D. C., and Bethesda, Maryland, manufacturers of modern oil filtration equipment, has announced the appointment of Mr. Charles W. Miller, Jr., as a member of the engineering staff. Mr. Miller is compiling special market data on oil and engine maintenance in the commercial aviation field, and is responsible for compiling test data on airlines equipment.

H. K. PORTER COMPANY, INC. has appointed John A. Comstock as director of research and metallurgy for all divisions. He will be in charge of the central research and testing laboratory located in Pittsburgh. Individual laboratories for plant control will be located at McKeesport, Pa., Newark, N. J., and Mt. Vernon, Illinois. Previous to his affiliation with Porter, Mr. Comstock served as engineering metallurgist with the United Aircraft Corp. of East Hartford, Connecticut.

Frederick A. Stevenson, president, **AMERICAN CAR AND FOUNDRY COMPANY**, has been notified by the Commonwealth of Pennsylvania, State Council of Defense, that the Company's Berwick, Pennsylvania plant has received the National Security Award, signifying extraordinary achievement in establishing and maintaining superior security and protection measures against air raids, fire, sabotage and avoidable accidents.

George W. O'Keeffe, for the past two years Dryer Division-Sales Manager of **PROCTOR & SCHWARTZ, INC.**, Philadelphia, manufacturers of industrial drying equipment and textile machinery, has been named vice-president, in charge of Dryer division sales. Mr. O'Keeffe, who is a graduate of Stevens Institute, has been with Proctor & Schwartz since shortly after World War I, during which he served as an officer in the U. S. Army.

John M. Frey has been appointed central district representative of the Thermex Division of **THE GIRDLER CORPORATION.** His new office is in the Builders Bldg., 228 North LaSalle St., Chicago.

Mr. Frey was the Chicago representative of the Hilliard Co. before joining The Girdler Corporation's Thermex Division in January, 1945. He formerly was associated with the Fairbanks-Morse Co. and was purchasing agent for the Eugene Dietzgen Co.

R. C. Campbell has been named by **THE DORR COMPANY** to administer the company's European, African and Middle Eastern activities. He continues as an advisor to the chemical division in the handling of beet sugar work. Prior to the war Mr. Campbell was assistant manager of The Dorr Company's operations in Europe.

A. M. Andrews, veteran pilot of many war theatres, has joined the staff of the **BRIGGS CLARIFIER COMPANY**, of Washington, D. C. and Bethesda, Maryland. As one of the chief service engineers for the aviation division, he will concentrate his activities chiefly on commercial airline service.

Two appointments in **GENERAL ELECTRIC'S** Industrial Divisions name J. J. Huether assistant manager of the divisions, and W. A. Wirene manager of the industrial materials division, of the industrial divisions. Mr. Huether had been manager of the industrial Materials Division for eight years, with Mr. Wirene as assistant manager since 1942.

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Mr. Frey was the Chicago representative of the Hilliard Co. before joining The Girdler Corporation.

A. D. Camp has been assigned by **THE DORR COMPANY** to its Foreign Sales Division. He was formerly manager of the technical data division and advertising manager.

Dr. Charles E. Skinner, founder of the research laboratories, of **WESTINGHOUSE ELECTRIC CORPORATION**, who recently retired as a civilian consultant of the Army Signal Corps, was honored recently by his former Westinghouse associates at a dinner marking his eightieth birthday. During the past two years Dr. Skinner was stationed at Fort Monmouth, N. J., aiding in research and development work for the Signal Corps under Colonel Lee Sutherlin, who once worked as a research engineer under his direction at Westinghouse.

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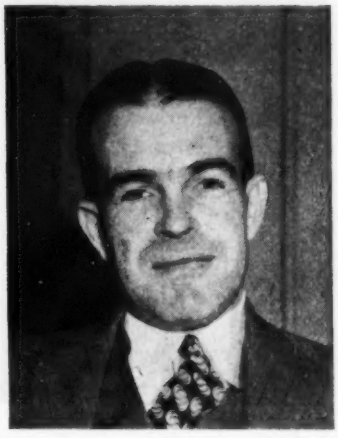
ASSOCIATIONS

Chicago Rubber Group Names New Officers

The Chicago Rubber Group held its final meeting of the season May 18, 1945. The following officers were elected: chairman, James P. Sheridan, New Jersey Zinc Sales Co.; vice-chairman, Francis S. Frost, Jr., Frost Rubber Works, and secretary-treasurer, William N. Crumpler, George S. Mepham Corp.

Blake Heads Goodrich Chemical Engineering Staff



T. U. Blake has been named chief engineer for the B. F. Goodrich Chemical Co. He will be succeeded as plant engineer at Port Neches, by F. V. Morrison. Mr. Blake will head the company engineering staff serving the plants in Niagara Falls, New York, Louisville, Kentucky, and Akron, Ohio.

A. I. C. Elects New Councilors

The American Institute of Chemists, by mail ballot, has elected the following new Councilors for three-year terms expiring in May 1948: Dr. Norman A. Shepard, chemical director, American Cyanamid Company, New York, N. Y.; Dr. W. D. Turner, assistant professor of chemical engineering, Columbia University, New York, N. Y., and Dr. James R. Withrow, professor and chairman, chemical engineering dept., Ohio State University, Columbus, Ohio.

The retiring Councilors are Dr. Donald R. Andrews, professor of chemistry, Johns Hopkins University, Baltimore, Maryland; Dr. Foster D. Snell, president of Foster D. Snell, Inc.; and Dr. W. D. Turner, reelected as above.

Tanner to Head Food Technologists

The Institute of Food Technologists announced at a meeting of the council, which was held in lieu of the general annual conference business meeting, the following officers, who were elected by mail: president, F. W. Tanner, head of the department of bacteriology, University of Illinois; vice-president, Victor Conquest, director of research and development, Armour and Co.; and secretary-treasurer, George J. Hucker, New York Agricultural Experiment Station. Councilors-at-Large are: M. L. Laing, chief chemist, Armour and Company; Paul Logue, director sales development and technical service, Monsanto Chemical Co.; B. E. Proctor, professor of food technology, Massachusetts Institute of Technology; A. E. Stevenson, assistant director of research, Continental Can Co.; and P. C. Wilbur, Food Machinery Corp.

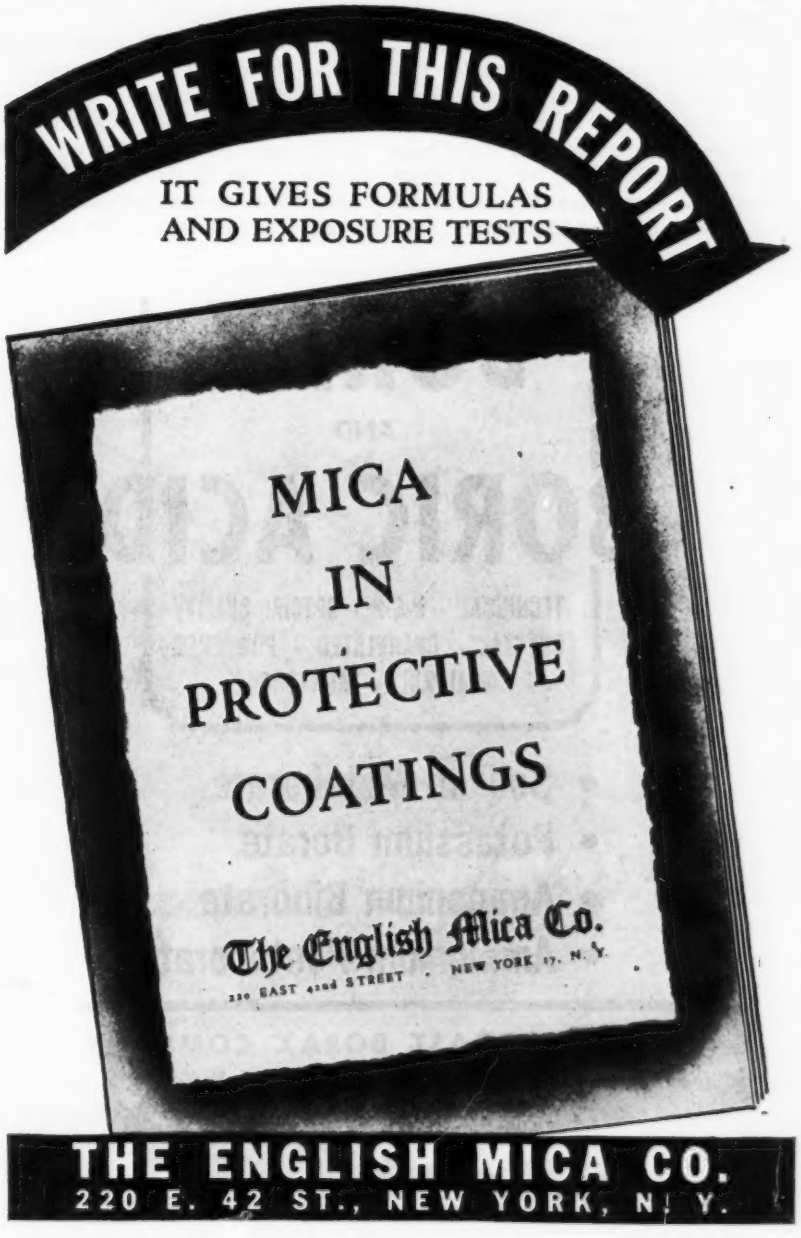
Refrigeration Manufacturers Assn. Chooses Officers

F. J. Hood, vice-president of the Ansul Chemical Co., Marinette, Wis., was elected president of the Refrigeration Equipment Manufacturers Association at a meeting of the new board of directors in the LaSalle Hotel, Chicago, May 24. He succeeds Arthur B. Schellenberg, president of the Alco Valve Co., St. Louis, Mo., as head of the association which comprises more than 75 members representing every branch of the refrigeration and air conditioning industries.

Other new officers chosen at the meeting were: H. F. Spoehrer, Sporlan Valve Co., St. Louis, vice-president; Edward M. Flannery, Bush Manufacturing Co., Hartford, Conn., secretary; and J. A. Strachan, Weatherhead Co., Cleveland, treasurer. R. Kennedy Hanson continues as executive secretary with offices in the association's general headquarters in Pittsburgh.

Wisconsin Petition Denied

The Wisconsin Alumni Research Foundation was denied on June 11, by the Supreme Court, a petition which asked for the review of a decision which held invalid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IT GIVES FORMULAS AND EXPOSURE TESTS
MICA IN PROTECTIVE COATINGS
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THE ENGLISH MICA CO.
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three patents relating to production of Vitamin D.

The claims of the patents, which were acquired by the foundation, for discoveries made by Harry Steenbock, a University of Wisconsin scientist, were called invalid by Los Angeles attorneys for Vitamin Technologists, Inc., "because anticipated by immemorial agricultural and horticultural processes."

The Ninth Federal Circuit Court ruled the patents invalid in a decision which reversed the United States District Court for Southern California. The District Court also held that the patents were infringed by Vitamin Technologists, Inc.

PERSONNEL

Wu of China Studies American Methods

Shou-Chung Wu, head of the Analytical Chemical Laboratory, Ministry of Economic Affairs of the Republic of China, Chungking, is spending a year's leave of absence from his official duties studying the operations of an American analytical and testing laboratory. Mr. Wu's hosts are Skinner & Sherman, Inc., 246 Stuart Street, Boston, members of the American Council of Commercial Laboratories. Mr. Wu was graduated from the National Central University of China, Nanking, in 1934 with a degree in Chemical Engineering. His special study of American methods is being made with the sanction of the U. S. War and State Departments and under the auspices of the Chinese government.

M. R. Hilleman Wins Ricketts Award

Maurice R. Hilleman, a member of the scientific staff at the New Brunswick, N. J., laboratories of E. R. Squibb & Sons, has been chosen recipient of the Howard Taylor Ricketts award for outstanding research on viruses.

GE Plastics Division Make Personnel Changes

Kenneth B. Goldblum and Roger Rice have received new appointments, according to an announcement made by Dr. J. J. Pyle, chief chemist of General Electric's plastics divisions.

Dr. Goldblum will serve as group leader in charge of the research and development section of the chemical Laboratory. He has been employed by G. E. since 1940 and was previously group leader of the standards and testing section of the chemical laboratory.

Mr. Rice will assume the position formerly held by Dr. Goldblum. Before joining G. E. in 1943 he was employed by the War Department as a plastics specialist.

Recent additions to the laboratory staff include David J. Morrison and Alex E. Holstein to the resin development group, John W. Wellman to the research and chemical development group, G. Marshall Naul to the laminating development group, and John W. Chapin to the chemical engineering group.

Flebut Chosen Western Manager

A. J. Flebut has been named western manager of Niagara Sprayer and Chemical Co., Inc., a subsidiary of Food Machinery Corp. His headquarters will be in Richmond, California.

Du Pont Reorganizes Finishes Division

J. Warren Kinsman, general manager of the Du Pont Company fabrics and finishes department, has announced a partial reorganization of the finishes division.

E. S. Nickerson, assistant manager of the Fabrics Division, has been made assistant general manager of the department; H. H. Hopkins, director of the Philadelphia laboratory, manager of the finishes division; and Matt Denning, director of sales of the division, assistant manager of that division.

The three men whom they succeed are planning to retire from the company during the next year. They are J. J. Moosmann, succeeded by Mr. Nickerson; E. M. Flaherty, succeeded by Dr. Hopkins, and W. M. Zintl, succeeded by Mr. Denning.

H. R. Lounsbury, refinish sales manager, succeeds Mr. Denning as director of sales and in turn is succeeded by D. E. Goldich, Mid-West manager of refinish sales. J. W. Nestor, assistant manager of industrial sales, is appointed assistant director of sales, a new position.

R. M. Allen, manager, refinish sales,

BORAX
AND
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TECHNICAL • U-S-P • SPECIAL QUALITY
CRYSTAL • GRANULATED • POWDERED
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- Sodium Metaborate
- Potassium Borate
- Ammonium Biborate
- Ammonium Pentaborate

PACIFIC COAST BORAX COMPANY
51 MADISON AVENUE, NEW YORK 10, N. Y.
CHICAGO 16 • LOS ANGELES 14

Philadelphia branch office, is named assistant manager of refinish sales, a new position; J. B. Dietz succeeds Mr. Nestor as assistant manager, industrial sales, and S. L. McSorley, Mid-West manager of trade sales, is appointed assistant manager of trade sales, another new position.

In the Chicago office, Mr. McSorley is succeeded by H. R. Marsh, formerly supervisor trade sales, and Mr. Goldich by A. P. Lins, formerly manager of the Chicago refinish store.

The five research laboratories of the department are being constituted into a Chemical Division, the director of which will report to the departmental general management. As a result the following additional appointments are made:

John Marshall, director of the chemical section, finishes division, appointed director of the new chemical division; J. Dorman McBurney, director, Newburgh, N. Y., laboratory, appointed assistant director, chemical division; R. E. Thomas, formerly chemical superintendent, Newburgh, N. Y., appointed to succeed Dr. McBurney; J. B. Bullitt, Jr., formerly assistant chemical director of the Philadelphia laboratory, to succeed Dr. Hopkins as director, Philadelphia laboratory, and P. B. Cochran, formerly patent technologist at the Parlin, N. J., laboratory, appointed assistant for patents to succeed E. H. Nollau, deceased.

OBITUARY

Derby Lost Off Okinawa

LIEUTENANT HARRY LEIGH DERBY, JR., U. S. N. R., has been killed in action in the Pacific, according to a Navy Department telegram received by his parents, Mr. and Mrs. H. L. Derby, of Montclair, New Jersey. No further details were given. Lieutenant Derby was thirty-eight years old.

Before volunteering for Navy duty in 1942, Lieutenant Derby was Western Sales Manager of the American Cyanamid & Chemical Corporation in Chicago, Ill.

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We refer to the vapors being removed from thousands of Condensers and Processing Vessels by Croll-Reynolds Steam Jet Evactors. Production Equipment for this apparatus is being pushed to keep up with what seems to be an ever-increasing demand. Now, even more than ever, we are eager to help the operators of the many thousands of Croll-Reynolds Evactors get the maximum performance from existing equipment. New units are still being furnished with surprising promptness where suitable priorities are available.

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Carter Named Hercules Chief Chemist

The appointment of Richard P. Carter as chief chemist of Hercules Powder Company's Mansfield, Mass., chemical plant has been announced by Raymond F. Schlaanstine, director of operations of the synthetics department. Dr. Carter, who for the past two years has been an assistant to Mr. Schlaanstine in Wilmington, Del., succeeds R. L. Marsh who has resigned.

E. I. LaBeaume, member of Hercules Powder Company's advertising department, has joined temporarily the staff of the Harvard Commission on English Language Studies at Miami, Florida. Mr. LaBeaume will work with the director of the commission, I. A. Richards, as an associate on the translation of U. S. Navy handbooks and manuals into Basic English.

The appointment of William LeRoy Parker, of Marshallton, Delaware, as Hercules research fellow in the Department of Entomology, at the University of Delaware, has been announced by Dr. L. A. Stearns, head of that department.

Monsanto Reports Personnel Changes

Dr. Earl W. Gluesenkamp and Dr. James H. Lum, assistant directors of research of Monsanto Chemical Company's Central Research Laboratories, Dayton, Ohio, according to Dr. Carroll A. Hochwalt, central research director of the company. Dr. Gluesenkamp, formerly group leader in charge of synthetic detergent investigations, was placed in charge of all organic chemistry research groups, while the responsibilities of Dr. Lum, director of two war research projects, were extended to include all research in inorganic and physical chemistry and physics.

Henry V. Moss has been transferred from the research laboratory at Carondelet, Missouri to Anniston, Alabama, as supervisor of inorganic research. All research activities at Carondelet have been moved to Anniston to improve coordination of the two sections.

Promotion of Robert C. Thumser as plant engineer of Monsanto's John F. Queeny plant, St. Louis, has been announced by Paul G. Marsh, plant manager. Mr. Thumser will be responsible for the mechanical, maintenance and construction division and for the power division.

W. C. Durning, formerly mechanical engineer in charge of power plant maintenance and construction, has been advanced to the position of superintendent of the power plant, and Norville Predock, formerly assistant superintendent of maintenance and construction, to the position of superintendent of maintenance and construction.

Norris Boehmer and Clarence Barbre, formerly operating superintendents, have

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each been advanced to the rank of manufacturing superintendent at Monsanto Chemical Company's Plant at Monsanto, Ill., according to an announcement by P. M. Tompkins, plant manager. The promotions were occasioned by the death on April 24 of Robert M. Sanford, manufacturing superintendent, and a rearrangement of supervisory duties made necessary by plant expansions. Announcement also was made that E. W. Lieben, W. Neil and R. L. Miller have been advanced to the rank of operating superintendent at the same plant.

American Cyanamid Names Two Sales Managers

George F. Ballard and James Gorman have been appointed divisional sales managers of the fertilizer division of American Cyanamid Co.

Mr. Ballard will handle all sales of Florida pebble phosphate rock for acidulation and ground phosphate rock for both mixing and direct application.

Mr. Gorman will handle all sales of cyanamide for agricultural purposes in the Eastern half of the United States.

Battelle Institute Increases Staff

John B. Data, formerly with the Lederle Laboratories, Inc., and William A. Zobel have joined the staff of Battelle Institute, where they will be engaged in research in organic chemistry. Dr. Zobel was formerly associated with the Hilton Davis Chemical Co. and more recently with a research chemist with the E. I. du Pont de Nemours and Co.

Also assigned to the organic chemistry division is J. C. Hackney, formerly assistant professor of chemistry, Denison University, Granville, Ohio. Erwin C. Hoeman, lately associated with the U. S. Bureau of Mines, at Rolla, Mo., will be engaged at Battelle in chemical and ceramic research.

Winthrop Promotes Jordan

Election of J. Gill Jordan as assistant secretary of Winthrop Chemical Company, Inc., has been announced by Dr. Theodore G. Klumpp, president.

Associated with Winthrop for 16 years, Mr. Jordan has been since 1936 divisional manager of its San Francisco professional service office, covering eleven Pacific Coast states.

National Starch Appoints Daniels and Piel

National Starch Products Inc. announce the election to its directorate of Joseph J. Daniels, a member of the firm of Baker and Daniels, Indianapolis attorneys. Mr. Daniels is also a director of The Fletcher Trust Co., The Indiana Water Co., The James Whitcomb Riley Hospital Association, The Wm. E. English Fourdation, and many other organizations.

At the same time, Herbert C. Piel, who has full charge of National's extensive and expanding operations at its Indianapolis plant, was advanced to assistant vice-president of the corporation, in line with its policy of promoting from the ranks.

Perkins Returns to Merck

Colonel George W. Perkins has been re-elected executive vice-president and treasurer of Merck & Co., Inc., manufacturing chemists, Rahway, N. J. Colonel Perkins, who also is a director of the company, has been on leave of absence since April 1942, when he entered government service. He returned to Merck about June 1.

Rumford Chemical Promotes Harvey

John E. Harvey, Jr., has been appointed assistant chief engineer of Rumford Chemical Works, Rumford, R. I., manufacturers of baking powder and industrial chemicals. For six years he has been connected with the engineering department of Rumford Chemical Works as power engineer.

Other personnel changes include Fred W. Meuschke who has been made advertising manager, and Charles A. Williamson, named assistant to the sales mana-

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ger, food products division. Mr. Meuschke joined Rumford Chemical Works after serving three years with the U. S. Army. For the past nine months, Mr. Williamson has been engaged in sales and merchandising research for Rumford.

Du Pont Shifts Personnel

Spencer Brownell, Jr., an attorney in the Legal Department of E. I. du Pont de Nemours and Company, has been appointed special assistant to W. S. Carpenter, Jr., president of the company.

Mr. Brownell succeeds Dr. C. Lalor Burdick, who has been appointed chairman of the board of Cia. Mexicana de Explosivos, which operates a commercial dynamite plant in Mexico, and chairman of the board of Du Pont S. A., general sales office for other Du Pont products in that country.

The Du Pont Company has announced appointment of C. H. Doherty, Jr., manager of the Belle Works here, as assistant production manager under J. L. E. Cheetham, production manager of the Ammonia Department, with headquarters in Wilmington, Del.

E. R. Habicht, assistant works manager at Belle, will succeed Mr. Doherty as works manager. The new assistant works manager will be F. A. Otto, who has been on special assignment.

Personnel Notes

ALBERT F. WEIMER has joined the sales staff of Faesy & Besthoff, Inc. He was formerly connected with the Grasselli Chemicals Department of the Du Pont Company.

DR. HENRY DELASZLO, managing director of L. Light and Co., Ltd., O.d Bowry Laboratories, Wraybury, Bucks, England, is visiting the United States in connection with the plan that effective August 1, his company will act as agents in the United Kingdom for products of the Apex Chemical Co.

W. E. VOGLER has been appointed director of industrial relations and personnel for the Houdry Process Corp., Wilmington, Del. Mr. Vogler has been consultant to industry on industrial relations for many years. His experience also includes work at Perdue University and for Socony-Vacuum Oil Co., Inc.

C. E. SCHOTT, formerly of the sales department of Woburn Chemical Company, has set up his own offices at 220 Broadway, New York City, where he is engaged in the distribution of compounding chemicals for the rubber industry.

FRED T. TECHTER is succeeding S. B. Haskell who has resigned as manager of the sales agency department of the Barrett Division of the Allied Chemical & Dye Corp. Mr. Techter will be in charge of sales of nitrogen products and of tank-car quantities of light oil distillates.

SAM A. DAVIS, formerly of Akron, O., has been appointed vice-president and general manager of the Chicago offices and plant of The C. P. Hall Company of Illinois.

HARLEY L. KNAUER has been appointed merchandising manager of Standard Laboratories, Inc. The company is being organized by William R. Warner & Co., Inc., to distribute its proprietary drug and toiletry products. Mr. Knauer was formerly a special representative of the Warner company.

DR. FRED H. RHODES, Cornell University professor of industrial chemistry and George Edward Allen, vice-president and director of the Home Insurance Co., have been named directors of General Aniline and Film Corp., to succeed Dr. Robert E. Wilson who resigned to become chairman of Standard Oil of Indiana and Dr. Robert Carr, deceased.

JAMES FORRESTAL has been named assistant to E. A. Williford, vice president in charge of the Ansco division of the General Aniline & Film Corp. In addition to his new duties, Mr. Forrestal will continue in charge of the Ansco marketing division.

E. T. FRANKENHOFF, vice-president of the Dicalite Co. and former manager of the central division, has moved his headquarters from Chicago to Los Angeles.

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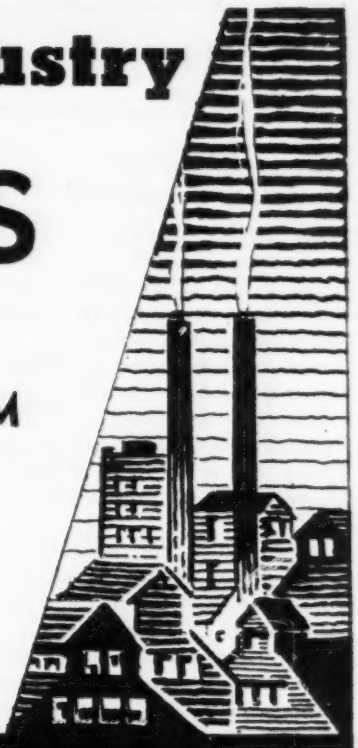

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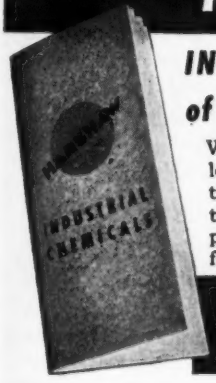

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Rogers Chemical Company Organized

The Rogers Chemical Co., organized to produce household and industrial chemicals and to do research work on plastics and coatings, has established offices and manufacturing plant at 9729 Conant Avenue. Initial production will be devoted to the preparation of cleaners, polishes and insecticides.

President of the new company is Don Rogers, who is also vice-president of the Mac-o-lac Paint & Varnish Works, Detroit.

In addition to the two-story building on Conant Avenue with a floor space of 8,000 square feet, the company has purchased a site on Mound Road at Outer Drive. They will also have offices in New York, Chicago, Los Angeles and downtown Detroit. The company will manufacture products based on some of the new discoveries of the war, such as "D. D. T." Production on most items will be small due to the limited amount of these chemicals now available.

Motor Fuels from Farm Wastes

The ground residue or raw material is first treated with an acid, or saccharified, to produce concentrated solutions of dextrose and xylose, which are fermented into alcohol, butanol, and acetone. Under the new saccharification process relatively pure, separate solutions of 5-carbon sugars and 6-carbon sugars are obtained. These solutions contain from 10 to 15 percent of sugar, which is about the content that is used in industrial fermentation. Furfural and lignin are at present obtained as by-products of the process. The new plant is designed to produce approximately 2,000 pounds of dextrose, 1,600 pounds of xylose, 1,000 pounds of lignin, and 200 pounds of furfural from 6,600 pounds of raw residue in an eight-hour operating period.

Experiment Station Improves Spray Dusting

A machine that applies a finely atomized liquid carrying insecticides or fungicides in dust form to fruit trees so as to produce an artificial dew at will regardless of the time of day has proved highly effective in tests carried on by scientists at the State Experiment Station at Geneva. With further development, it is hoped to devise an outfit with low initial cost and light weight as major considerations.

The spray-duster has been found especially effective in treating peaches and cherries and is expected to give good results with prunes. The machine is particularly well adapted to delivering the dust upward through the foliage, an important factor in combating many insects and diseases which attack only the under side of the leaves.

Flame-Proofing of Porous Materials

Elimination of fire hazards is claimed by the manufacturers of Pal, a modified phosphor-alum in the form of a water-soluble crystalline powder.

A water solution, containing about one pound of the material per gallon of hot water, is used to spray, dip, or brush porous materials, such as lumber or textiles. The solution is said to penetrate quickly and does not stiffen or harden fabrics.

Sheffield Farms Active In Amino Acid Field

Long a large scale producer of casein, raw material used in amino acid preparations, the Chemurgic Department of Sheffield Farms Co., Inc., a division of the National Dairy Products Corporation, is currently engaged in progressive research on protein nutrients. Present products includue N-Z-Amine, Hy-Case, and N-Z-Case. Last named is the most recent. It is described as an improved powdered tryptic digest of casein and is recommended for general culture work.

This research is in the hands of Dr. D B. Hand. He works closely with Dr. E V. McCollom, who divides his time between the department of hygiene and nutrition at Johns Hopkins University and the Sealtest Laboratories, Baltimore, Md.

Belt Dressing

Graton and Knight research laboratories have developed a new formula liquid belt dressing which will be merchandised under the "Grako" trade name.

Repeated tests with the new Grako show an improvement of 15% to 20% increase in transmission from rating upwards, with a greater percentage rise for belts which are pulling under their rating.

This performance with Grako is achieved without the use of pitch, rosin or rosinous materials, petroleum by-products, soap, acids, alkalies or other ingredients harmful to belting. In fact, all the oils contained in Grako are nutritive to leather and will greatly prolong its life. Regular use will keep the belting pliable and glove-like which is necessary for good transmission capacity.

The new Grako pours readily at freezing temperature, 32° F. It will not "cake" or "gum-up" on pulleys and belts and is particularly adaptable for conditions where steam and water are bothersome.

All Grako labels will have the words, "New Formula" overprinted on them in red ink.

Jefferies Succeeded by Nunnally in WFA

Thomas L. Jefferies, who has been in charge of the Fertilizers Division of the Chemicals and Fertilizers Branch, War Food Administration, has resigned and will return to Chilean Nitrate Sales Corp. He has been succeeded by J. E. Nunnally, who has been serving as Field Service Representative of the Chemicals and Fertilizers Branch in the Southern area.

Naval Stores Producers Plan Publicity Campaign

The board of directors of the American Turpentine Farmers Association, together with representatives of naval stores producers and processors, decided recently upon a $500,000 annual advertising and research program to begin not later than 1946. Harley Langdale, Sr., association president, urged adoption of the program and full support by all producing members of the industry.

A postwar planning committee will be appointed to secure the support of all gum farmers through membership in the organization and to inaugurate the advertising and research program.

Wood Council Discusses Lignin Use

The use of lignin for fertilizers was discussed at a special closed meeting of the Northeastern Wood Utilization Council in Orono, Maine, on June 29. Participants included leaders of industry, forestry, agriculture and research.

Kimmel Heads American Resinous Adhesives

M. A. Kimmel now heads the Adhesives Department of American Resinous Chemicals Corporation. His new responsibilities include direction of research and development in adhesives and full charge of adhesives sales. Mr. Kimmel is a graduate of Massachusetts Institute of Technology.

Agricultural Insecticide Assn. Adds Directors

Joseph L. Batty and Walter S. Gavan have been named to the board of directors of the Agricultural Insecticide and Fungicide Association.

Mr. Batty is vice-president in charge of purchasing for Cooperative G. L. F. Soil Building Service, Inc., a division of Cooperative Grange League Federation, Inc.

Mr. Gavan is manager of the insecticide department of American Cyanamid & Chemical Corporation, New York.

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WAR REGULATIONS SUMMARY

ALLYL ALCOHOL AND CHLORIDE — (WPB) Order M-342 has been revoked, releasing control of these materials.

ALUMINUM CHLORIDE, ANHYDROUS— (WPB) Order M-287 has been revoked.

COUMARONE-INDENE RESINS—(WPB) Increased requirements have necessitated allocation under Schedule 110 of Order M-300. Small-order exemption is 500 lbs. per month.

DIRECTORY OF COMMODITIES AND SERVICES—(OPA) 5th edition available from Supt. of Documents, Govt. Printing Office, for $1.25. Lists officials, all price regulations, and indexes alphabetically about 10,000 major commodities and services.

ETHYL ALCOHOL—(WPB) Schedule 71 of Order M-300 amended to clarify definition of imported ethyl alcohol. Imported cane alcohol (Order L-348) is not under the schedule except that which is tax-free for industrial uses.

FURFURAL—(WPB) Order M-224 has been revoked.

INSECTICIDE MATERIALS — (WPB) Schedules 48 and 49 of Order M-300 amended to change allocation period for pyrethrum and rotenone from a month to a quarter.

MALEIC, FUMARIC, "CARBIC," AND PENTAERYTHRITOL OILS AND RESINS — (WPB) Schedule 103 of Order M-300 amended to eliminate use of preference ratings. They will be allocated according to end-use groupings in Direction 2 to M-300.

MISCELLANEOUS CHEMICALS—(WPB) Order M-340 amended to establish restrictions on use of certified preferred orders, the definition of which was amended.

NAVAL STORES—(OPA) Amendments to MPR 446, 179, 431, and the General MPR increased some producers' ceiling prices for pine tar, pine tar oil, pine oil, pine wood charcoal, turpentine, dipentene, pitch, and similar products.

OSMIUM—(WPB) Amendment of Order M-302 liberalized use of osmium alloys up to 12½ per cent of consumer's use in 1941. New users are allowed 2 oz. per quarter.

PARAFFIN WAX—(WPB) Crude scale and refined paraffin wax allocated under Schedule 108 of Order M-300. Small-order exemption is 2,000 lbs. per month.

PHOSPHATE PLASTICIZERS — (WPB) Schedule 61 of Order M-300 amended to save paper work. Control shifted from Appendix A to Appendix C. Small-order exemptions for tricresyl phosphate and triphenyl phosphate raised to 535 and 225 lbs. per month respectively.

PYRIDINE—(WPB) Control shifted from Order M-185 (revoked) to Schedule 109 of Order M-300. No change in restrictions.

REPORTS—(WPB) Priorities Regulation 8 amended to permit WPB to require continuation of reports called for by revoked orders and regulations.

RUBBER—(WPB) Rubber Order R-1 revised and amended to include all changes issued since Nov. 9, 1944.

SODIUM BICHROMATE—(WPB) Amendment of Schedule 62 of Order M-300 provides filing of one-time report for uses within small-order exemption, i.e., from 450 to 4,000 lbs. per month.

THALLIUM CHEMICALS—(WPB) Allocation initiated under Schedule 107 of Order M-300. Monthly small-order exemption of one-eighth lb. each of the acetate, chloride, formate, and sulfate.

THERMOMETERS—(WPB) Schedule 7 of Order L-272 revoked to eliminate restrictions as to finishes, sizes, types, models, and markings. Production is still subject to Order M-293.

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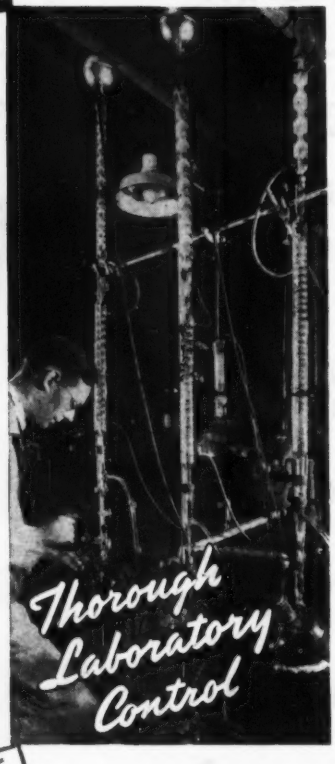

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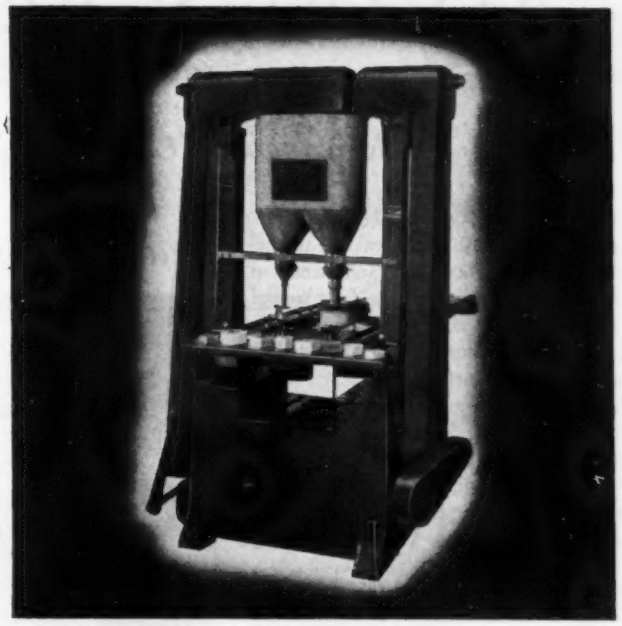

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CANADIAN NEWS

by W. A. JORDAN

Emphasis on Research at C. I. C. Conference

COORDINATION of Research and the National Welfare was the theme under which some 600 U. S. and Canadian chemical men convened at the first annual conference of the recently formed Chemical Institute of Canada, held at the Chateau Frontenac, Quebec City, last month.

Apart from the numerous papers presented by Canadian scientists on current developments in the fields of pure, biological, agricultural, rubber, paint, and textile chemistry, the highlight of the program was the research symposium under the chairmanship of Dr. H. B. Speakman, Ontario Research Foundation.

More C. I. C. Pictures p. 90

All the papers delivered at the symposium were noteworthy for their clear, direct, and realistic appraisal of the problems which face Canada in a research sense, and provided concrete suggestions as to the course which must be followed in the interest of national welfare and progress. In particular, Gilbert E. Jackson, Toronto, stressed the point that more funds must be provided for research on a much larger scale than has ever been contemplated in Canada hitherto, with close integration of all research facilities, to minimize the competitive handicap which the Dominion must face in that the total number of research workers in a country of Canada's limited population must remain relatively small. Mr. Jackson maintained that by coordination of the efforts of small groups of experts, substantial success might be realized with regard to quality, rather than quantity, of research work.

Dr. D. L. Thomson, McGill University, emphasized the fact that industry has often overlooked the importance of universities to its progress, and has not realized that universities are the very hub of the research wheel; the source of expert personnel; of both men and ideas. In the interest of industry's progress, according to Dr. Thomson, universities must be well financed and well staffed, so that they may serve adequately in providing capable technical personnel and the basic knowledge of pure research.

Dr. C. J. Mackenzie, National Research Council, regarded the activities of a government organization such as the Council as fundamental to industrial progress, in that almost 95 per cent of existing business institutions are too small to support independent, efficient, research departments, and suggested that he viewed the possible development of the Council along the lines of the Mellon Institute.

Dr. R. K. Stratford, Imperial Oil, Ltd., pointed out that more technical men should be employed in the application of research in order to speed up the exploitation of the advances of modern science, and F. C. Rutherford, Lightning Fastener Co., Ltd., gave a paper on behalf of Harold G. Fox, outlining the role played by a sane, efficient patent system, in the sponsoring of research initiative.

R. T. Baldwin, New York City, speaking at the concluding luncheon, characterized the essentiality of research by noting that no business holds an impregnable position, and satisfaction with a product or process means stagnation and inevitable recession.

New Officers

Elected first president of the new organization was Dr. R. R. McLaughlin, head of the department of chemical engineering, University of Toronto, with C. A. H. Wright, engineer for Consolidated Mining & Smelting Co., Trail, B C., as vice-president. A. F. G. Cadenhead of Shawinigan Chemicals, Ltd., has served as interim chairman of the organization until the new officers could be elected. The Institute also elected its board of directors for the coming year, headed by Dr. McLaughlin. Directors include Mr. Wright; Dr. R. K. Larmour, Saskatoon; Dr. R. K. Stratford, Sarnia; Hugh D. Cameron, Toronto; L. E. Westman, Ottawa; Dr. Leon Lortie, Dr. R. V. Nicholls and Dr. H. R. L. Streight, Montreal; Dr. J. A. McConbrey, Shawinigan Falls; Dr. H. J. Rowley, Fredericton; and Dr. Paul E. Gagnon, Quebec.

Elected to Top Offices in Chemical Institute of Canada

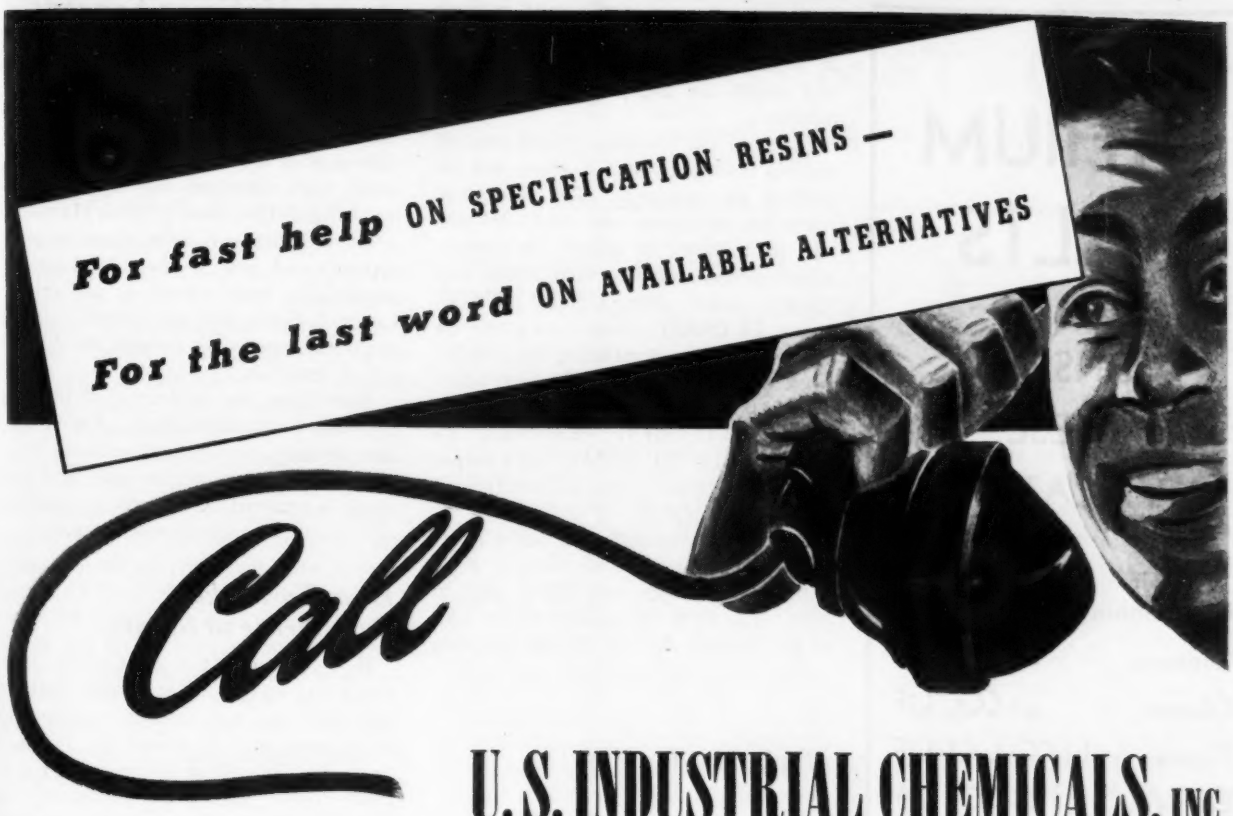
Dr. R. R. McLaughlin, professor of chemical engineering at the University of Toronto, is the newly-elected president of the Chemical Institute of Canada, and C. A. H. Wright, chemical engineer at Consolidated Mining & Smelting Co., Trail, B. C., is the new vice-president.

1944 Chemical Output Down As Imports Hit New High

Although Canada's chemical and allied industries continued to operate at close to peak levels during most of 1944, preliminary figures compiled by W. H. Losee and H. McLeod of the Bureau of Statistics indicate that the total output for the year slipped some six per cent below 1943's all-time high of $765 million. This recession was due mainly to curtailed ammunition and propellant schedules in the early months of the year, as there were about equal losses and gains among the other industries in the chemical category.

The value for 1944 has been estimated at $719.9 million, which is more than four times the best prewar total of $159.5 million established in 1939. The shell filling and small arms ammunition industries account for a very large proportion of the totals of the war years, and if these were excluded the value for 1944 would be $364 million, compared with $359 million in 1943, and $348 million in 1942.

In 1944 there were 955 operating establishments in the chemical and allied industries, 489 of which were in Ontario and 318 in Quebec, with the latter accounting for 50 per cent of the production and the former 42 per cent of the



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total. The average employment in these works was 81,895, including about 39,000 in shell filling operations, and salaries and wages for the year totaled $135.7 million.

Seven of the chemical groups showed declines in output values last year and six chalked up increases. The percentage losses are as follows, with total 1944 output, in millions of dollars, bracketed: miscellaneous, including shell filling, 10.9 ($430); heavy chemicals, 2.2 ($76.7); paints, 3.8 ($43.3); compressed gases, 1.1 ($9.1); coal tar distillation, 4.6 ($6.2); wood distillation, 11.3 ($1.5); and adhesives, 3.0 ($5.6). The gains were: fertilizers, 14.4 ($31.0); medicinals, 7.9 ($54.8); soaps, 3.1 ($32.6); toilet preparations, 8.4 ($16.8); inks, 5.4 ($4.9); and polishes, 11.0 ($7.2).

Imports of chemicals and allied products reached an all-time high of $80.8 million, or 14.6 per cent higher than in 1943. The U. S. A. supplied 86 per cent of the receipts and the United Kingdom accounted for ten per cent of the total.

Gov't. H_2SO_4 Plant to Nichols

Nichols Chemical Co. Ltd., Canadian subsidiary of General Chemical Co., has recently purchased the Government-owned Valleyfield, P. Q. sulphuric acid plant which Nichols has operated for the Crown since its wartime creation. The original cost of this unit is listed as $1.3 million, with the Nichols purchase price revealed as $700,000.

Terms of the sale require a cash deposit of $100,000 and the balance "in cash on completion." The company has undertaken to purchase all raw materials and finished product in the plant as of May 28 at book value; to purchase such spare parts and operating supplies as it desires at their book value, and to purchase "the spare parts and operating supplies for the production of oleum, at prices to be negotiated."

The completion of this transaction by the government is the first revealed implementation of the government's basic policy of withdrawing from most chemical manufacturing activities at the conclusion of the period of production emergencies, with the stated exception of synthetic rubber. It is probable that the sale of other Crown-owned chemical facilities to private corporations will be negotiated in the near future, in view of the fact that Canadian production of chemicals and explosives, which has amounted to some 1,500,000 tons in the past few years, has always been supplementary to U. S. A. and British output.

Therefore, with total demand for many wartime chemicals and explosives tapering sharply, Canadian producers are the first to be affected by cut-backs in the overall program.

Ayerst, McKenna Expands Research Laboratories

Ayerst, McKenna and Harrison Ltd., Montreal, Canadian subsidiary of American Home Products Co., plans the further extension of its research laboratories—which were completed only a year ago—according to Chairman William Harrison.

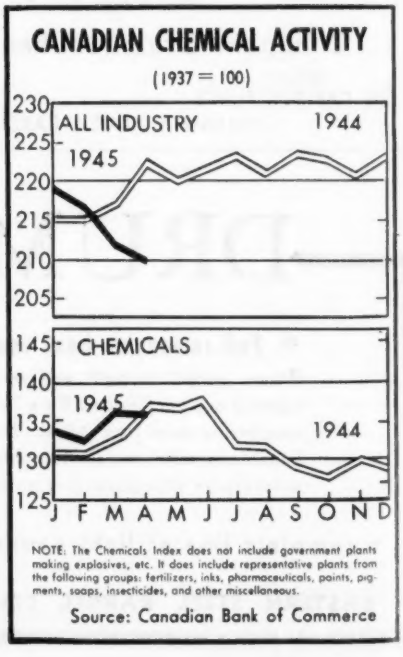
Major emphasis is to be placed on pure research and new product development, particularly with regard to endocrines, bacteriologicals, and the newer field of antibiotics, opened up through the discovery of penicillin.

Apart from the production of its long established pharmaceuticals, Ayerst has been operating one of the Dominion's three penicillin units for the past year, and currently is reported to be devoting considerable attention to streptomycin research.

Dow To Make Polystyrene at Sarnia

Dow Chemical Co. of Canada Ltd., which was established at Sarnia, Ontario, two years ago and has been engaged in the manufacture of styrene for Polymer Corp., the $48 million, Crown-owned synthetic rubber project, has purchased 113 acres adjacent to its present site to permit postwar expansion of its manufacturing activities, according to Manager George Hemmerick.

Government releases state that Dow plans the construction of polystyrene facilities at a cost of "several hundreds of thousands of dollars." According to Hon. C. D. Howe, Minister of Munitions and Supplies, a contract has been entered into between Dow and Polymer Corp. for sale by the government-owned corporation to the chemical concern of a minimum of 500,000 lbs. per month of styrene monomer. This will make Dow the Dominion's first polystyrene producer.



New High in Potash Sales

New records have been made in the annual production and sales of domestic potassium salts. In 1944, according to reports of producers to the Bureau of Mines, United States Department of the Interior, 1,578,498 short tons of marketable potassium salts containing 834,568 tons of equivalent potash (K_2O) were produced. A somewhat smaller quantity, 1,543,420 tons, likewise a record, was sold. According to the producers, this material contained 817,892 tons of equivalent potash. Stocks of potassium salts in terms of K_2O in producers' hands at the end of 1944 were more than double those of 1943 and larger than in any recent year.

The present domestic potash mines can produce more than normal domestic requirements under peacetime conditions. Availability of foreign supplies after the war will limit foreign markets for American potash, and certain of these potash producing nations may enter the domestic market in competition with American companies, especially if it is considered advisable to restrict domestic production to conserve our known potash resources. The enlarged food production programs probably will maintain domestic potash output at high levels for some time.

The domestic potash industry is based largely upon the sylvite (KCl) deposits of the Carlsbad (N. Mex.) region, the potassium-bearing brines of Searles Lake, Calif., and Saludro Marsh, Utah, and the langbeinite ($K_2SO_4.2\ MgSO_4$) deposits of the Carlsbad region. Estimates made about 1940 placed the total known resources of water soluble potash in the above deposits at around 90 million tons K_2O, adequate for only about 100 years at the present rate of consumption. Even on the basis of these early estimates the Committee on National Fertilizers and Lime Policy of the Department of Agriculture and War Food Administration ("A National Policy for Fertilizers and Liming Materials": Wash., D. C., February 1945, 11 pp.) urges that greatly intensified efforts be made by the Federal Government to discover new domestic sources of water-soluble potash on public land; that until vastly larger deposits are discovered, our limited known resources be looked upon as a strategic reserve; and that, if extensive new deposits are not located soon, further vigorous steps be taken to curtail the use of American deposits and replace them with imports.

Most of the known domestic potash reserves are in the Texas-New Mexico field. According to estimates made in 1940 these beds contain 75,000,000 tons K_2O. Such estimates were based on beds of potash salts 4 feet or more in thickness which analyze at least 14 percent K_2O. Mansfield and Lang (Mansfield, G. R., and Lang, W. B., The Texas-New Mexico Potash Deposits: Univ. Texas Bull. 3401, 1935, pp. 641-832 (See page 682)), after calling attention to the fairly wide distribution of sylvite in this field state that: "The richer sylvite beds are localized in 4 known minor areas which have been prospected in some detail and which are surrounded by barren or relatively barren ground. Such prospecting as has been done outside of these areas has not thus far led to any very encouraging results, but it is quite possible that other rich localities may be discovered . . ."

Three of these known areas are now being mined and the fourth was prospected by the Government in 1944. The reserves in the areas now producing are being rapidly exhausted. The Government drilling in the fourth area in the Carlsbad region proved up only a few million tons of K_2O. The known economically recoverable potash reserves in this field therefore appear quite limited.

National security requires further search for deposits of soluble potash. Probable areas where such deposits might be found include the Texas-New Mexico field, the Grand County (Utah) field, and eastern United States. Possibilities are definitely known in the first two fields. The salt deposits of eastern United States have never been tested for potash beds by core drilling, although well brines show significant quantities of potash, and salt beds containing 8 percent KCl have been found in Nova Scotia, northeast of this area.

The annual increase in production of marketable potassium salts in the United States since 1934 was once more evident in 1944. Again it was large, 149,658 tons more being produced in 1944 than in 1943, and the approximate equivalent K_2O content of the production was 95,427 tons greater. Sales exceeded a million and a half (1,543,420) tons in 1944, and were a little more than 10 percent over 1943. The contained equivalent potash (K_2O) was 817,892 short tons, an increase of nearly 12 percent over 1943. Production exceeded sales; producers' stocks were again larger at the end of the year than at the beginning, and larger than in several recent years. The average value of the potassium salts sold in 1944 was $19.11 per ton.

Potassium salts produced in the United States, 1942-44, by grades

(in short tons)

Grade	1942	1943	1944
Muriate of potash: 60-62 percent K_2O minimum[1]	878,997	934,961	1,082,132
48-50 percent K_2O minimum	85,680	99,137	114,550
Manure salts, run-of-mine	183,404	242,189	217,560
Sulfate of potash and sulfate of potash-magnesia	119,374	152,553	164,256
	1,267,455	1,428,840	1,578,498

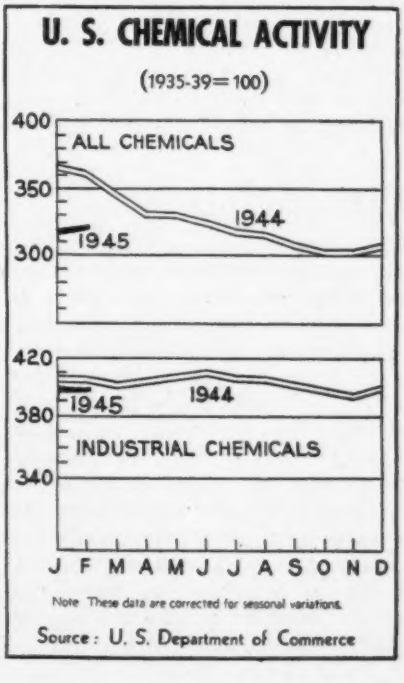
[1] Includes refined potash.

Foreign Trade

Both imports and exports of industrial chemicals increased in the period 1941-44, reflecting increasing Lend-Lease shipments and the necessity of importing certain strategic materials, according to a report made public by the Bureau of the Census, U. S. Department of Commerce.

The figures are misleading inasmuch as they are given in dollar value rather than quantity of material. Since the dollar value of industrial chemicals has not changed as much as that of other commodities, however, the statistics provide a substantially accurate picture of trade trends.

	Thousands of Dollars
Imports	
1941	15,287
1942	24,272
1943	28,322
1944	38,591
Exports	
1941	63,263
1942	86,191
1943	116,849
1944	131,055



Phosphate Rock

Another record for the annual marketed production of domestic phosphate rock was made in 1944, the quantity sold or used by producers reaching 5,376,643 long tons, according to reports by the producers to the Bureau of Mines, United States Department of the Interior—about one quarter million tons above the figure reported for 1943, the previous record. All States, except Virginia, showed increases. The total value ($20,856,429) was nearly 2 million dollars greater than in 1943. Mined production was over 5 million tons in 1944. Figures for mined production and stocks for 1944 are not strictly comparable with those for 1943 because of the inclusion in 1943 of considerable quantities of Tennessee brown rock matrix in the reported figures. The P_2O_5 content of the domestic phosphate rock sold or used in 1944 was 1,739,489 tons.

The quantity of domestic phosphate rock sold or used by producers reached a new high record in 1944 and exceeded the previous maximum of 1943 by 250,411 long tons. The total value in 1944 was nearly 2 million dollars above that of 1943. The average value per ton of the phosphate rock sold or used was nearly 5 percent greater than in 1943.

The most popular grades of phosphate rock sold or used by producers in the United States in 1944, according to reports from them, were the 72-percent B.P.L. grade and the 75/74-percent B.P.L. grade. The quantity of phosphate rock containing less than 60 percent B.P.L. sold or used continued to increase and in 1944 formed 12 percent of the total.

In 1944, the quantity of domestic phosphate rock sold or used by producers in the United States for the production of superphosphate is reported to have been slightly larger than in 1943. Increases were also registered in the quantity sold or used for the production of various chemicals and also for direct application to the soil. Less is reported to have been used in 1944 than in 1943 for fertilizer filler and for stock and poultry feed.

Salient Statistics of the Phosphate-Rock Industry in the United States, 1943-44

	1943			1944		
	Long tons			Long tons		
	Rock	P_2O_5 content	Value at Mines	Rock	P_2O_5 content	Value at Mines
Production (mined)	5,369,967	1,611,215	(1)	5,200,002	1,673,860	(1)
Sold or used by producers:						
Florida:						
Land pebble	3,483,194	1,179,314	$11,633,241	3,670,208	1,241,519	$13,136,472
Soft rock	71,171	14,739	254,995	60,087	12,526	259,523
Hard rock	34,128	12,208	201,241	22,500	8,056	138,952
Total Florida	3,588,493	1,206,261	12,089,477	3,752,795	1,262,101	13,534,947
Tennessee[2][3]	1,309,059	375,502	5,822,249	1,324,849	381,621	5,975,337
Idaho	108,916	34,709	561,630	112,565	35,804	584,400
Montana	119,764	38,021	488,665	186,434	59,963	761,745
Utah	.....	.....	.....	.....	.....	.....
Virginia	(3)	(3)	(3)	(3)	(3)	(3)
Total United States	5,126,232	1,654,493	18,962,021	5,376,643	1,739,489	20,856,429
Stocks in producers' hands, Dec. 31:						
Florida	1,110,000	371,000	(1)	815,000	273,000	(1)
Tennessee[2][4]	640,000	136,000	(1)	410,000	115,000	(1)
Western States	2,000	1,000	(1)	2,000	1,000	(1)
Total stocks	1,752,000	508,000	(1)	1,227,000	389,000	(1)

[1] Data not available. [2] Includes sintered matrix. [3] Virginia included with Tennessee. [4] Includes brown rock matrix of sinter grade, sintered brown rock, blue rock, and some matrix of washer grade.

Phosphate Rock Sold or Used by Producers in the United States, 1940-44

Year	Long tons	Value at mines: Total	Value at mines: Average	Year	Long tons	Value at mines: Total	Value at mines: Average
1940	4,002,700	$12,334,662	$3.08	1943	5,126,232	$18,962,021	$3.70
1941	4,689,652	15,596,273	3.33	1944	5,376,643	20,856,429	3.88
1942	4,644,240	16,597,492	3.57				

Phosphate Rock Sold or Used by Producers in the United States, 1943-44, by Grades

	1943			1944		
	Quantity			Quantity		
Grades—B.P.L.[1] content (per cent):	Long tons	Per cent of total	Value	Long tons	Per cent of total	Value
Below 60	566,704	11	(2)	669,228	12	(2)
60 to 66	186,726	4	(2)	210,561	4	(2)
68 basis, 66 minimum	264,043	5	(2)	223,935	4	(2)
70 minimum	490,208	9	(2)	672,218	13	(2)
72 minimum	1,611,500	31	(2)	1,291,850	24	(2)
75 basis, 74 minimum	698,476	14	(2)	1,107,149	21	(2)
77 basis, 76 minimum	851,055	17	(2)	883,815	16	(2)
Above 85 (apatite) / Undistributed[3]	457,520	9	(2)	317,887	6	(2)
	5,126,232	100	$18,962,021	5,376,643	100	$20,856,429

[1] Bone phosphate of lime.
[2] Figures not available.
[3] Includes numerous grades of B.P.L. content from 65.9 to 85 per cent.

Lead Output Decreases

The domestic mine production of lead (in terms of recoverable metal) in February 1945 was 31,298 short tons, a decrease of 3,102 short tons from the January output, according to preliminary estimates of the Bureau of Mines, United States Department of the Interior. The average daily production in February was 1,118 tons, a slight increase over the average daily production of 1,110 tons in January, but 7 tons below the 1944 average daily production of 1,125 tons.

February output of lead from the Eastern States dropped 116 tons below January production due to decreased production from the New Jersey Zinc Co. mines.

Sulphur Sales at Record Level

In the first quarter of 1945 sales of sulfur were at a record level, according to figures released by the Bureau of Mines, United States Department of the Interior. Nearly a million tons were shipped from the mines. Production was 39 percent greater than in the same period of 1944 but was slightly below the record set in 1942. As sales exceeded production producers' stocks declined 176,947 long tons.

Production, mine shipments, apparent sales, and producers' stocks of native sulfur in the United States in selected periods, 1942-43-44-45, in long tons.

Sulphur Production for First Quarter of 1945

Period	Production	Mine shipments	Apparent sales*	Producers' stocks**
Jan.-March 1945	826,667	999,885	1,003,614	3,923,373
Jan.-March 1944	595,593	801,122	806,070	4,251,744
Jan.-March 1943	664,611	581,753	663,883	5,115,214
Jan.-March 1942	837,989	724,863	702,864	4,820,968
March 1945	290,268	385,543	363,327	3,923,373

* Calculated from production and change in stocks during the period.
** Producers' stocks at mines, in transit, and in warehouses at end of period.

Zinc Activity Shows Rise

During March the zinc industry showed a general increase in production, consumption, shipments and receipts, according to the Bureau of Mines, United States Department of the Interior.

Stocks of slab zinc at consumers' plants gained, but producers' stocks of slab zinc, zinc oxide, and zinc dust were slightly less. The 95,225 tons of slab zinc on hand at consumers' plants on March 31, 1945, was the highest month's-end total recorded since October 1940.

Total output of zinc oxide, zinc dust and slab zinc increased, but the daily production rate of zinc oxide and slab zinc was down slightly.

Consumption of slab zinc increased. The total of 91,286 tons used is the highest monthly rate recorded by this survey.

Receipts of slab zinc at consumers' plants increased 22 percent over February to establish a new high record of 110,015 tons.

Secondary slab zinc production at 8 operating plants in March (secondary smelters only) amounted to 2,077 tons including 817 tons of intermediate, 266 tons of brass special, and 994 tons of prime western. Production of intermediate grade increased, but brass special and prime western grades decreased.

In addition to stocks held at producers' and consumers' plants on March 31 (tables 5 and 8), 25,925 tons of slab zinc was in transit to consumers and for further refining. At the end of March the zinc in transit showed a drop for the first time since December 1944. The tonnage routed to brass mills accounted for 55 percent of the total.

Production in March was 32,726 short tons, an increase of 1,548 short tons over the February output. The average daily production in March was 1,056 tons, compared with 1,114 tons in February.

Lead production from the Eastern States increased 38 tons due to a gain in output from the New Jersey Zinc Co. mines at Austinville, Virginia. The production of the Central States remained approximately the same.

The March output of lead from the combined Western States increased 1,337 tons (9 percent) but was 1,109 tons below the 1944 average monthly production of 17,242 tons. Idaho lead output increased 921 tons over the February production but continued to be lower than the 1944 average monthly production of 6,851 tons.

Magnesium Production Up

Shipments of magnesium permanent mold and die castings in March topped all previous records according to information just released by the Aluminum and Magnesium Division, War Production Board. Permanent mold casting shipments were 683,000 pounds, and die castings—increasing 30 percent from the previous month—reached 281,000,000 pounds.

Shipments of all other magnesium products also showed gains during the month. Deliveries of sand castings were 6,700,000 pounds, the highest level since April 1944. Sheet shipments increased 19 percent to 248,000 pounds, and extrusions advanced 16 percent to 277,000 pounds. Deliveries of forgings were 28,000 pounds, double the February figure.

Primary metal production rose 12 percent to 6,658,000 pounds and secondary recovery increased a third to 2,804,000 pounds.

Product	Pounds (thousands) February 1945	Pounds (thousands) March 1945	% Change from February
Metal production:			
Primary production	5,960	6,658	+11.7
Secondary recovery	2,116	2,804	+32.5

Table 1.—Producers' stocks, production, and shipments of zinc oxide (lead-free and leaded, by grades) in March 1945, and the total (all oxide) January-March 1945, in short tons

	Stocks at beginning of month	Production during the month	Shipments during the month	Stocks at end of month
January: Total all oxide	19,761	17,070	16,765	20,066
February: Total all oxide	20,066	16,421	17,205	19,282
March: Total all oxide	19,282	18,144	19,117	18,309
Total	.....	51,635	53,087	.....
Monthly average	.....	17,212	17,690	.....
March:				
Lead-free:				
American process—Ore & scrap residues[1]	[2]15,881	9,411	10,486	[2]14,806
French process—Slab zinc, remelt & scrap	360	2,083	1,827	616
Other processes—Dust residues & scrap	359	917	1,021	255
Total	16,600	12,411	13,334	15,677
Leaded:				
5 percent lead or less	228	290	310	208
5-35 percent lead	2,038	3,942	4,008	1,972
Over 35 percent lead	416	1,501	1,465	452
Total	2,682	5,733	5,783	2,632
Total—all oxide	19,282	18,144	19,117	18,309

[1] Includes ore residues.
[2] Includes small tonnage of French process oxide not separable.

Table 2.—Raw materials used in the production of zinc oxide in March 1945, in short tons[1]

Material used	Stocks Feb. 28 Zn content	Received during Mar. Zn content	Consumed during Mar. Gross weight	Consumed during Mar. Zinc content	Stocks Mar. 31 Zn content
Zinc ore	24,207	7,838	24,317	8,264	23,781
Slab zinc	502	1,812	1,724	1,724	590
Ore residues	6,180	4,282	5,545	3,287	7,175
Total	30,889	13,932	31,586	13,275	31,546

[1] Excludes zinc dust residues, secondary residues, scrap zinc and remelt zinc.

Production of lead in January-December 1944, January, February, and March (preliminary) 1945, by regions and States in terms of recoverable metal based on smelter receipts, except the Central and Eastern States, which are mill outputs, in short tons

Region and State	January December	January	February	March (preliminary)
Eastern States	6,169	489	386	424
Central States	197,451	18,142	15,996	16,169
Western States:				
Arizona	16,478	1,635	1,566	1,650
California	5,713	[1]327	408	400
Colorado	17,241	1,309	1,157	1,167
Idaho	82,214	6,275	5,679	6,600
Montana	13,883	847	996	1,125
Nevada	6,539	[1]511	461	500
New Mexico	6,669	437	603	506
Oregon	7	.....	.....	.....
South Dakota	33	.....	.....	.....
Utah	52,276	3,794	3,513	3,750
Washington	5,845	372	413	435
	206,898	[1]15,507	14,796	16,133
Alaska	62	.....	.....	.....
	410,580	[1]34,138	31,178	32,726

[1] Revised figures.

Mineral Wool

Mineral wool production in 1944, as reported by producers to the Bureau of Mines, United States Department of the Interior, reached 568,296 short tons valued at $54,482,796, an increase of $10,812,086 in value and 16,772 tons in quantity over the 1943 total. The production of home and industrial insulation increased, but the greatest change occurred in the industrial field.

The large increase in dollar value is attributed to the amendment of Order A-2 of Maximum Price Regulation 188, effective from September 16, 1943, granting relief to mineral wool manufacturers to cover increased manufacturing costs, and the larger production of the relatively higher cost industrial insulation. Prices in 1944, per short ton, in carlots f.o.b. plant were $37.50 for loose and $53 for granulated wool, compared with $30 and $45 respectively in 1943.

Production in 1944 came from 38 companies operating 51 plants in 19 States, compared with 40 companies operating 53 plants in 19 States in 1943. These plants utilized 10 types of raw material, which include slag, 49 companies; limestone, 20; shale, 12; clay, 7; glass batch, 7; gravel, 2; silica, 4; and iron ore, granite, and silica gravel, 1 each. Fuel used in all of these processes amounted to 144,125 tons of coal; 150,375 tons of coke; 2,405,202 gallons of oil; 1,835,081,644 cubic feet of gas, and 45,571,119 kilowatt hours of electricity.

The postwar market for mineral wool insulation will be strong. However, with the increased use of lightweight glass insulation more emphasis will be placed on the density per cubic foot of the finished product. Because of the bulk of most mineral wool products, which prohibits

haulage over great distances, prices are controlled largely by local conditions, and it is difficult to make an estimate of price conditions for the industry as a whole. It is believed, however, that postwar prices for loose and granulated mineral wool, f. o. b. plant will approximate respectively the 1943 figure.

Plastics Industry Growth

According to a report prepared by Dr. Louis Long, M.I.T., on "Sugar and Sugar By-Products in the Plastics Industry," the annual total production in the United States of all types of plastics rose during the ten years from 1931 to 1941 from 35,000,000 lbs. to 500,000,000 lbs., a fourteen-fold increase.

Government Statistics

Relaxation of the Bureau of the Budget's security regulations permits the release for public distribution of the heretofore confidential 1943 Minerals Yearbook, the Nation's most comprehensive and authoritative publication on the production, distribution, and consumption of mineral commodities. Containing foreign trade information and other data that might have been of value to the enemy, editions published thus far during the war have been withheld from general distribution until now.

Bound copies of the 1943 Yearbook now may be obtained for $2.50 each from the Superintendent of Documents, U. S. Printing Office, Washington 25, D. C. A limited number of copies of the 1942 edition, which also was released recently, likewise are available from the Superintendent of Documents at $2.25 each, together with certain separately printed chapters ranging in price from 5 to 15 cents.

The Yearbook usually contains from 65 to 75 chapters covering all of the known mineral commodities in daily use, and each is prepared by a Bureau of Mines specialist in the field. In general, the separate chapters fall under three main divisions: Metals, nonmetallic or industrial minerals, and fuels.

Features of the latest edition released include a review of the mineral industries in 1943, a section on international aspects of war mineral procurement, and a statistical summary of mineral production making current for the first time since 1931 the detailed output by states. Sections in the various chapters cover the post-war outlook on all but a few of the minerals treated, and a number of new charts are presented.

The 1943 Yearbook and certain separate chapters have been placed on sale by the Superintendent of Documents, Washington 25, D. C. The cost of the bound volume of the Minerals Yearbook is $2.50, and the prices of the chapters vary. Copies are not sold by the Bureau.

The data given in the following table supplement the figures released beginning March 1, 1944, in the Facts for Industry Series 6-2-1 to 6-2-15. Information concerning the limitations of the data, the completeness of coverage, and the selection of items were given in the Series 6-2-1 report.

In the table, production (except as noted in footnote 10) includes material produced whether consumed in the producing plants or sold. Consumption represents consumption at producing plants only; it includes material produced in such plants, or material purchased or transferred from other plants. Stocks are company stocks, as of the last day of the year or month, located at plant, in transit, or in warehouse, and include purchased as well as produced material.

Synthetic Organic Chemicals: United States Production, Consumption, and Stocks

(In pounds, except that creosote oil is expressed in gallons.)

Item	Production	March 1945 Consumption	Stocks
Acetanilide (technical and U.S.P.)	620,502	[4]	247,628
Acetic acid (synthetic)[1]	23,266,187	21,135,458	7,094,051
Acetic acid (natural, including that from calcium acetate)[2]	2,811,107	[4]	1,586,759
Acetic anhydride[3]	47,675,185	32,772,573	11,251,786
Acetylsalicylic acid (Aspirin)	924,117	[4]	958,652
n-Butyl acetate	6,829,413	[4]	2,312,791
Creosote oil, tar distillers[5]	12,568,662	[4]	10,677,695
Creosote oil, byproduct[6]	3,463,613	16,763	851,640
Cresols, meta-para[7]	589,526	[4]	273,584
Cresols, ortho-meta-para[7]	881,564	[4]	[4]
Cresylic acid, crude	2,377,914	[4]	907,160
Cresylic acid, refined[7]	2,574,089	[4]	1,255,083
Diethyl ether (all grades)	8,082,245	[4]	3,891,486
Ethyl acetate (85 percent)	9,244,430	997,798	5,535,732
Lactic acid (edible)	381,994	[4]	[4]
Lactic acid (technical)	428,627	[4]	309,175
Methyl chloride (all grades)	2,688,205	[4]	600,513
Naphthalene, less than 79° C. (coke-oven operators)[8]	7,934,492	.....	2,172,850
Naphthalene, less than 79° C. (tar distillers)[9]	[10]18,168,471	[4]	5,132,983
Naphthalene, refined (79° C. and over)	5,745,529	3,621,042	1,475,841
Oxalic acid (technical)	1,720,416	[4]	331,178
Phenobarbital and sodium salts	32,047	[4]	42,926
Phthalic anhydride	11,375,340	3,396,022	2,014,637
Riboflavin (for human use)	[4]	1,194	26,620
Sulfa drugs (total)	558,822	[4]	567,066

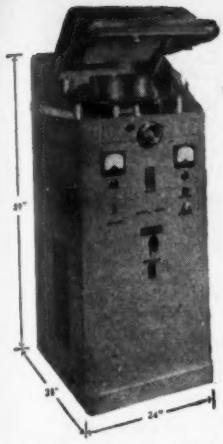
[1] Excludes statistics on recovered acetic acid, which are confidential.
[2] Natural acetic acid (produced by direct process from wood) and acetic acid distilled from calcium acetate. These statistics are collected and compiled by the U. S. Bureau of the Census.
[3] Represents all acetic anhydride, including that produced from acetic acid by the vapor-phase process.
[4] Confidential; publication would disclose operations of individual companies.
[5] Product of distillers who use purchased coal tar only.
[6] Product of byproduct coke-oven operators only. These statistics are collected and compiled by the Coal Economics Division, U. S. Bureau of Mines.
[7] Statistics represent total production, consumption, and stocks, including both data reported by coke-oven operators to the Coal Economics Division, Bureau of Mines, and data reported by distillers of purchased coal tar to the U. S. Tariff ommission. Data reported to the two agencies are combined to prevent the disclosure of the operations of individual companies.
[8] Includes only the production, consumption and stocks of coke-oven operators. Statistics combine the three grades (solidifying at less than 74° C., at 74° C. to less than 76° C., and at 76° C to less than 79° C.) in order to prevent the disclosure of the operations of individual companies. These statistics are collected and compiled by the Coal Economics Division, Bureau of Mines.
[9] Includes only the production, consumption and stocks of distillers of purchased coal tar. Statistics combine the grades specified in footnote 8, in order to prevent the disclosure of the operations of individual companies.
[10] For the grade solidifying at less than 74° C., these statistics represent production for sale only; for the other two grades, they represent production both for consumption within the producing plant and for sale. Production for consumption of the grade solidifying at less than 74° C. is excluded in order to minimize duplication as this grade is frequently converted to grades of higher melting point.
[11] Includes acetylsulfathiazole produced both as a sulfa drug and as an intermediate, resulting in an appreciable duplication which is unavoidable.
Source: Statistics collected and compiled by the U. S. Tariff Commission, except where otherwise noted.

United States Production, Consumption and Stocks, January 1945

(Supplements data contained in January report)

Acetylene:				
For use in chemical synthesis	M cu. ft.	310,096	73,925	9,488
For commercial purposes	M cu. ft.	142,909		
Calcium carbide (commercial)	Short tons	61,759	(4)	28,307
Carbon dioxide:				
Liquid and gas	M pounds	16,442	2,816	2,392
Solid (dry ice)	M pounds	41,274	...	6,674
Copper acetoarsenite (Paris green)	M pounds	625	(1)	1,062
Hydrogen	Millions of cubic feet	2,071	1,752	(4)
Lead arsenate (acid and basic)	M pounds	8,593	87	14,948
Nitrous oxide	M gallons S.T.P.	12,525	...	4,692
Oxygen	M cu. ft.	1,394,517	31,205	(5)
Sodium phosphate:				
Monobasic (100% NaH_2PO_4)	Short tons	1,101	(1)	277
Dibasc (100% Na_2HPO_4)	Short tons	4,090	(1)	703
Tribasic (100% Na_3PO_4)	Shrot tons	6,875	247	1,803
Meta (100% $NaPO_3$)	Short tons	1,934	(1)	301
Tetra (100% $Na_4P_2O_7$)	Short tons	2,861	98	439
Sodium sulfate:				
Anhydrous (refined) (100% Na_2SO_4)	Short tons	5,295	(1)	1,920
Glauber's salt (100% $Na_2SO_4 \cdot 10H_2O$)[8]	Short tons	18,078	(1)	3,481
Salt cake (crude) (commercial)[9]	Short tons	46,258	4,135	83,184
Sulfur dioxide	M pounds	6,748	3,537	2,742

[1] Data cannot be published without disclosing operations of individual establishments. [2] Not yet available. [3] A small amount of aqua ammonia is included in the figures reported by one company. [4] Not available; see "Facts for Industry," Series 6-1-1. [5] Data for oxygen stocks are no longer collected. [6] Total wet and dry production, including quantities diverted for manufacture of caustic soda and sodium bicarbonate, and quantities processed to finished light and finished dense soda ash. For detailed discussion of soda ash statistics, see "Facts for Inustry, Series 6-1-1. [7] Not including quantities converted to finished dense soda ash. [8] Natural soda ash, Glauber's salt, crude salt cake and sulfuric acid data collected in cooperation with the Bureau of Mines. [9] Production figures represent total production of liquid material, including quantities evaporated to solid caustic and reported as such. Consumption figures represent quantities of both liquid and solid caustic consumed in producing plants exclusive of quantities of liquid caustic evaporated to soild. Stocks figures include quantities on hand of liquid and solid material. [10] Includes sulfuric acid of oleum grades. [11] Excludes spent acid. For detailed explanation see "Facts for Industry," Series 6-1-1.
* Revised.



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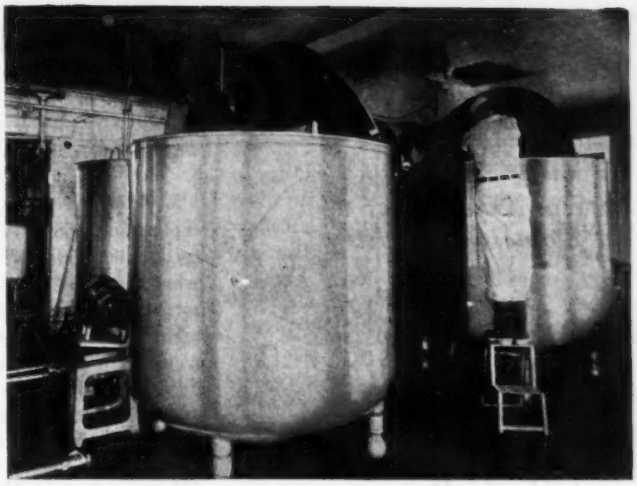

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MARKET INTERPRETATION AND REVIEW

Foreign Oil Threat To Domestic Industry

More Diesel Oil From Postwar Petroleum

V-Day Fails to Relieve Many Shortages

High-Grade Domestic Talc Discovered

Market Review

Oil Industry Fears Foreign Holdings

Unless imports are closely watched, vast petroleum reserves of the Middle East, South America, and Caribbean areas constitute a potential danger to domestic industry, Ralph T. Zook, president of the Independent Petroleum Association of America, declared recently.

The Middle East reserves have been estimated at 16 to 200 billion barrels, and planned expansion of facilities will bring daily production to 1,000,000 barrels. Caribbean and South American reserves are reported at 7 billion barrels, and production during 1945 is scheduled at 1,250,000. The total production from these fields will be a million barrels per day above prewar production.

There can be no market for this oil in the United States after the war; and if imports are not guarded, foreign oil will flood the market at a price which will kill the incentive of domestic producers to develop new fields.

"There are some who are ready to write off the United States as a strong producing nation. Others are planning to use the best market in the world, the United States, to cure the ills of other countries at the expense of our country."

Mr. Zook outlined a program emphasizing the rights of domestic producers:

1. Domestic production should be on sound conservation principles.

2. It should be such that waste through excessive above-ground storage will be eliminated.

3. The domestic industry should have the first opportunity to supply the nation's needs.

4. Imports should be limited to amounts required for adequate Government and civilian needs—not in quantities which will be harmful to the domestic industry.

5. Crude oil prices should be such that exploration and development are encouraged; that wells of small production be preserved; and that secondary recovery operations are promoted.

He also emphasized the danger in the event of a future war that, unless the American oil industry is maintained, we should have neither the necessary trained oil technologists nor the oil.

Character of Petroleum Products Will Change

Estimating a comparison between 1941, the last prewar year, and 1947, possibly the first postwar year, A. J. McIntosh, economist for the Socony-Vacuum Oil Co., Inc., predicted that the demand picture for petroleum products will differ widely.

The use of military gasoline will triple the 1941 figure—although it will be only a fifth as great as last year. Economies in gasoline consumption will more than offset the increased number of motor vehicles, he believes, and the demand for automotive gasoline will be down 9 per cent.

Consumption of fuel oil for home heating will increase 17 per cent, and the use of Diesel fuel will be up 30 per cent. Railroads are turning more and more to Diesel locomotion. It is difficult to appraise the jet turbine demands, but a large increase in that type of power generation would require lighter fractions than Diesel oil, though not so light as gasoline.

The bunker fuel market will be considerably greater than before the war, which fact leads Mr. McIntosh to predict a complementary import arrangement with South America. The South American fuels leave a larger proportion of residual oil, by using that for bunker fuel, the domestic production could be refined to provide more of the light ends.

Many Chemicals Tight For Duration of War

Shortly after V-E Day the War Production Board made public a list of chemicals that will continue in short supply as long as the Pacific war is in progress. While the situation will doubtlessly change in regard to some of these commodities, the list is published as a guide to industry as it prepares for civilian production.

The list is as follows:

Metals and Minerals

- Antimony and antimony oxide
- Bismuth and bismuth Chemicals
- Cadmium
- Corundum
- Graphite certain grades)
- Lead
- Mica (certain grades)
- Platinum and some of the platinum metals
- Talc (certain grades)
- Tin
- Certain ferro-alloys

Miscellaneous Materials and Products

- Acetylene black
- Antimony oxide
- Asbestos textiles
- Can enamels
- Carbon black
- Casein
- Cellophane
- Charcoal
- Chrome pigments
- Containers
- Cotton linters and hull fibre
- Detergents, synthetic organic
- Fats and oils
- Fibrous glass textiles
- Gasoline gum inhibitors
- Glue
- Kapok
- Leather
- Litharge
- Marine paints
- Matches
- Natural resins
- Nylon
- Oils for protective coatings
- Paper and paperboard
- Printing ink
- Rosin
- Rubber & sythetic rubber
- Ultramarine blue
- Vegetable tanning materials

Acids

- Acetic
- Adipic
- Carbolic (Phenol)
- Chromic
- Citric
- Hydrofluoric, anhydrous
- Maleic
- Naphthenic
- Phosphoric (by-product)
- Sulphuric
- Tar acid-oils (carbolates, etc.)
- Butyl
- Ethyl
- Hexanhydric
- Isopropyl
- Methyl (Methanol)
- Octyl

Alcohols

- Allyl
- Aliphatic, higher
- Amyl

Solvents

- Acetic anhydride
- Acetaldehyde
- Acetone
- Amyl acetate
- Butyl acetate
- Ethyl acetate
- Ethyl ether
- Isopropyl acetate
- Methyl ethyl ketone
- Methyl isobutyl ketone

Plastics, Plasticisers, Resins, etc.

- Acrylic monomer and acrylic resins
- Alkyd resins
- Cellophane
- Cellulose acetate
- Cellulose acetate butyrate molding powder
- Cellulose ester flake
- Coumarone—indene resins
- Ethyl cellulose
- Melamine aldehyde resins and molding compounds
- Nitrocellulose
- Phthalic alkyd resins
- Phosphate plasticisers
- Phthalate plasticisers
- Polyethylene
- Phenolic resins & molding compounds
- Styrene, polystyrene, Dichlorostyrene, Polydichlorostyrene
- Urea formaldehyde resins & Molding powders
- Vinyl polymers & resins
- Vulcanized fiber tubing

Insecticides and Fungicides

- Arsenic
- Copper chemicals
- D.D.T.
- Nicotine sulphate
- Pyrethrum
- Rotenone

Drugs and Pharmaceuticals

- Bismuth chemicals
- Cinchona Bark & Cinchona Alkaloids
- Caffeine
- Emetine
- Ipecac
- Penicillin
- Quinidine
- Quinine
- Vitamin "A"
- Nicotinic

Miscellaneous

- Alkylamines
- Alkanolamines
- Allyl chloride
- Ammonia, synthetic
- Ammonium silicofluoride
- Anhydrous aluminum chloride
- Aniline
- Anthraquinone
- Aromatic solvents
- Barium chemicals
- Bentonite, dessicant grade
- Benzaldehyde
- Benzene
- Calcium carbide
- Calcium hypochlorite, high test
- Calcium metal
- Camphor, synthetic
- Carbon tetrachloride
- Carbon tetrachloride
- Chemical cotton pulp
- Chlorinated paraffin
- Chlorine & chlorate chemicals
- Coal tar
- Copper chemicals
- Diphenylamine
- Formaldehyde & paraformaldehyde
- Ferro & ferri cyanides
- Furfural
- Glycol ethers
- Glycols
- Hexamethylene tetramine
- Iron oxide—yellow
- Lead chemicals
- Maleic anhydride
- Mercuric oxide, red
- Naphthalene
- Naphthenates
- Pentaerythitol
- Perchlorethylene
- Peroxygen chemicals
- Phenols & substituted phenols
- Phosphorus
- Pine oil
- Pine tar
- Potash
- Potassium carbonate
- Primary chromium chemicals
- Pyridine
- Quinizarin
- Reagent chemicals
- Rosin
- Silica gel
- Sodium cyanide
- Sodium metal
- Sodium phosphate
- Theobromine
- Toluene
- Trichlorethylene
- Xylene
- Zinc Oxide, lead free

It is evident from the above list that manufacturers of protective coatings and pharmaceuticals will have problems. Most of the natural and synthetic resins, plasticizers, solvents, and dryers are still tight, and only white pigments and a few lac-

quer solvents are available in any quantity. All orders placed with suppliers should allow 45 to 60 days for delivery, and orders may have to be spread over several sources of supply.

Drug and pharmaceutical manufacturers are further plagued by a shortage of containers; glass, metal, and fibreboard containers and lead tubes are all critically short. Sugar, vitamin A, bismuth salts, citric acid, peroxygen chemicals, ipecac, and emetine are particularly scarce, and the probability is that they will remain so for several months.

Self-Sufficiency In Talc Attained

The discovery of new domestic sources and the expansion of known deposits of talc suitable for making steatite radio and electronic equipment for the Army and Navy enabled the United States to become self-sufficient in this important commodity early in the war without having to depend upon imports or lower grades of domestic talc, the Bureau of Mines disclosed in making public the details of a survey completed two years ago.

Before the war, only one domestic mine yielded material suitable for steatite ceramic insulators and the principal raw materials were imported from France, Italy, and Manchuria, with some imports from India.

Although several eastern producers provided talc sufficiently pure for general purposes, such as the paint, ceramics, rubber, roofing, and paper industries, only one operation supplied the required grade for use in Army and Navy radio and electronic equipment, for new special ultra-high-frequency equipment, and for spark-plug covers needed for high-altitude operations.

In the examination of more than 200 samples from various producing mines and from undeveloped deposits, the Bureau survey showed that adequate reserves of talc for steatite insulators were available without resorting to beneficiation and still more could be added by beneficiation if necessary.

The major portion of these reserves were in areas surrounding the Sierra deposit in Inyo County, Calif., and in Esmeralda County, Nev., although some acceptable deposits were delineated in Montana, New Mexico, New York, Virginia, North Carolina, and Alabama.

Market Review

Heavy Chemicals. A firm market was reported in fluorides, trisodium phosphate, and bichromates. Seasonal demand for chlorine in water treatment has aggravated the supply situation. Caustic soda, too, remains scarce. Seasonal demands also strengthened the market for calcium chloride, used as a moisture absorbent and dust preventive, and for the water-treating chemicals, aluminum sulfate and activated carbon. The price situation in oxalic acid, whereby dealers are not permitted a sufficient profit on resale, is said to be a contributory factor in the present shortage.

Fine Chemicals. Brazilian menthol was still in a declining market; it is expected to go lower before it goes higher. The price of penicillin tumbled from $1.20 to $0.76 per 100,000 Oxford units. Mercury also tumbled from $157 to $149 per flask. The prices of mercurials, however, did not reflect the lower price of the parent substance. Shortages were noted in sulfathiazole, acetylsalicylic acid, Rochelle salt, and sodium salicylate. Less glycerine is going into protective coatings because of critical shortages of other component materials, such as rosin and phthalic anhydried; more is being withdrawn, however, for rocket powder, tobacco, cosmetics, and pharmaceuticals. Butyl alcohol and acetate were raised to the April price level and were said to be scarce; atropine sulfate went down in price. Thymol is scarce, but the supply of acetone is said to be easing. A brisk demand for dextrose and saccharine is reported as a result of the sugar shortage.

Agricultural Chemicals. Greater consumption of mixed or complete fertilizers has put the industry on a year-round rather than a seasonal basis. This is reflected in more stabilized employment conditions and will eventually be an influence, no doubt, on prices. The inventory of ammonium sulfate at the end of last month was reported to be a record low. Allocations of lead for lead arsenate can not be increased under present conditions. The insecticide material is quite scarce.

Paint Materials. Substantial improvement in the supply of rosin, lead, and drying oils is expected in some quarters by the last quarter of the year. No improvement is foreseen, however, in aromatic petroleum solvents, ester solvents and lacquers, alkyd resins, and chrome pigments.

Agricultural Nitrogen Demand Heavy

More nitrogen may be available for agricultural use in the near future, War Production Board officials told the members of the Nitrogen Producers Industry Advisory Committee at a recent meeting. However, WPB emphasized, at the present time nitrogen supplies are not adequate to meet all demands.

Two new projects, each with a monthly production capacity of approximately 5,000 tons, will probably start production within the next few months, the committee was told. Possible cuts in the munitions program would also mean more nitrogen for agriculture.

The committee unanimously recommended that allocation of nitrogen be continued on the present basis until it is possible for all controls to be removed completely.

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for

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Founded 1860

Share Capital & Reserves: Swiss francs 4.000.000.—

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References:

Swiss Bank Corporation, 15 Nassau Street, New York

CURRENT PRICES

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00 June, 1943, $0.900 June, 1944, $0.890 June, 1945,

	Current Market	1944 Low	1944 High	1943 Low	1943 High
Acetaldehyde,99%,drs.wks. lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs, ...lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv. .....lb.	...	.07	...	.07	...	.07
ACIDS						
Acetic, 28%, bbls ....100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls. .....100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tks, wks. .....100 lbs.	6.93	7.25	6.93	7.25	...	6.93
Acetylsalicylic, Standard USP .....lb.	.40	.54	.40	.54	.40	.54
Benzoic, tech, bbls. .....lb.	.43	.47	.39	.47	.39	.47
USP, bbls, 4,000 lbs. up lb.	...	.54	...	.54	...	.54
Boric tech, bbls, c-l,....tons *a*	...	109.00	...	109.00	...	109.00
Chlorosulfonic, drs, wks. ..lb.	.03	.04½	.03	.04½	.03	.04½
Citric, USP, crys, gran, bbls. .....lb. *b*	.20	.21	.20	.21	.20	.24
Cresylic 50%, 210-215° HB, drs. wks. frt. equal gal.	.81	.83	.81	.83	.81	.83
Formic, 85%-90% cbys. .lb.	.10	.11½	.10	.11½	.10½	.11½
Hydrofluoric, 30% rubber, dms. .....lbs.	.08	.09	.08	.09	.08	.09
Lactic, 22%, lgt, bbls wks lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks ...lb.	.073	.0755	.073	.0755	.073	.0755
Maleic, Anhydride, drs....lb.	.25	.26	.25	.26	.25	.26
Muriatic, 18° cbys ...100 lb.	1.50	2.45	1.50	2.45	1.50	2.45
20° cbys, c-l, wks ..100 lb.	...	1.75	...	1.75	...	1.75
22° cbys, c-l, wks ..100 lb.	...	2.25	...	2.25	...	2.25
Nitric,36° cbys, wks 100 lbs. *c*	5.00	5.25	5.00	5.25	5.00	5.25
38°, c-l, cbys, wks 100 lbs. *c*	...	5.50	...	5.50	...	5.50
40°, c-l, cbys, wks -100 lbs. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lbs. *c*	...	6.50	...	6.50	...	6.50
Oxalic, bbls, wks .....lb.	.11¼	.12½	.11¼	.12½	.11¼	.12½
Phosphoric, 100 lb. cbys, USP .....lb.	.10½	.13	.10½	.13	.10½	.13
Salicylic, tech, bbls .....lb.	.26	.42	.26	.42	.26	.44
Sulfuric, 60°, tks, wks ..ton	...	13.00	...	13.00	...	13.00
66°, tks, wks .....ton	...	16.50	...	16.50	...	16.50
Fuming 20% tks. wks .ton	...	19.50	...	19.50	...	19.50
Tartaric, USP, bbls .....lb.	.70½	.71	.70½	.71	...	.70½
Alcohol, Amyl (from Pentane) tks, delv .....lb.	...	.131	...	.131	...	.141
Butyl, normal, syn, tks lb.	...	.10¾	...	.10¾	.10¾	.14¼
Denatured, CD 14, c-l drs .....gal. *d*	...	.57	...	.57	...	.54½
Denatured, SD, No. 1, tks.*d*	...	.50	...	.50	...	.50
Ethyl, 190 proof tks...gal.	...	17.60	...	17.60	..	11.90
Isobutyl, ref'd, drs ....lb.	...	.086	...	.086	...	.086
Isopropyl ref'd, 91%, dms .....gal.	.37½	.41	.37½	.66½	.39	.66½
Alum, ammonia, lump, bbls, wks .....100 lb.	....	4.25	....	4.25	....	4.25
Aluminum, 98-99% ..100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd l.c.l. wks lb.	.09	.12	.08	.12	.08	.12
Hydrate, light, bgs. ....lb.	...	.14½	...	.14½	.14½	.15
Sulfate, com'l. bgs, wks, c-l .....100 lb.	1.15	1.25	1.15	1.25	1.15	1.25
Sulfate, iron-free, bgs, wks .....100 lb.	1.85	2.10	1.85	2.50	1.75	2.50
Ammonia anhyd, cyl .....lb.	...	.14½	...	.14½	...	.16
Ammonium Carbonate, USP, lumps, dms ...lb.	.08¼	.09¼	.08½	.09¼	.08¼	.09¼
Chloride,whi,bbls,wks,100 lb.	4.45	5.15	4.45	5.15	4.45	5.15
Nitrate, tech. bags, wks. lb.	.0435	.0850	.0435	.0850	.0435	.0850
Oxalate pure, grn. bbls. ..lb.	...	.23	.27	.33	.27	.33
Perchlorate, kgs .....lb.	No stocks		.55	.65	.55	.65
Phosphate, dibasic tech. bgs .....lb.	.07	.07¾	.07	.07¾	.07¼	.08½
Stearate, anhyd. dms. ...lb.		.34		.34		.34
Sulfate, dms, bulk ....ton	28.20	29.20	28.20	29.20	28.20	30.00
Amyl Acetate (from pentane) c-l, drs, delv .....lb.	....	.15½	...	.15½	...	.15½
Aniline Oil, drs .....lb.	.11½	.12½	.11½	.12½	.11¼	.12½
Anthraquinone, sub, bbls. .lb.	...	.70	...	.70	...	.70
Antimony Oxide, bgs ....lb.	.15	.15½	.15	.15½	.15	.15½
Arsenic, whi, kgs—powd. lb.	.04	.04¾	.04	.04¾	.04	.04¾

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; *y* Price given is per gal; *c* Yellow grades 25c per 100 lbs less in each case; *d* Prices given are Eastern schedule. *a* Powdered boric acid $5 a ton higher; *b* Powdered citric acid is ½c higher.

		Current Market	1944 Low	1944 High	1943 Low	1943 High
Barium Carbonate precip, wks, bgs	ton	60.00	75.00	55.00	75.00	55.00	65.00
Chloride, tech, cyst, bgs, zone 1	ton	73.00	78.00	73.00	90.00	77.00	90.00
Barytes, floated, bbls.	ton	...	36.00	...	36.00	...	36.00
Bauxite, bulk mines	ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde,tech,cbys,dms	lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, tks, ft all'd	gal.	...	.15	...	.15	...	.15
Benzyl Chloride, cbys	lb.	.22	.24	.22	.28	.22	.25
Beta-Naphthol, tech, bbls, wks	ton	.23	.24	.23	.24	.23	.24
Bismuth metal, ton lots	lb.	...	1.25	...	1.25	...	1.25
Blanc Fixe, 66⅔% Pulp, bbls, wks	ton	40.00	46.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks,100 lb.		2.50	3.60	2.50	3.60	2.50	3.60
Borax, tech, c-l, bgs	ton	...	45.00	...	45.00	...	45.00
Bordeaux Mixture, drs	lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases	lb.	.21	.23	.21	.30	.25	.30
Butyl, acetate, norm. drs,	lb.	.1825	.1875	.1755	.1945	.1575	.1840
Cadmium Metal	lb.	.90	.95	.90	.95	.90	.95
Calcium, Acetate, bgs, 100 lb.		3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs	ton	50.00	90.00	50.00	95.00	50.00	95.00
Carbonate, c-l bgs,	ton	18.00	22.00	18.00	22.00	18.00	22.00
Chloride, flake, bgs c-l	ton	18.50	35.00	18.50	35.00	18.50	35.00
Solid, 73-75% drs, c-l,	ton	18.00	34.50	18.00	34.50	18.00	31.50
Gluconate, U.S.P., drs.	lb.	.57	.59	.57	.59	.57	.58
Phosphate, tri, bbls, cl	lb.	...	.0635	.0635	.0785	.0635	.0785
Camphor, U.S.P., gran, powd, bbls	lb.	.69	.71	.68½	.71	.68½	.70½
Carbon Bisulfide, 55-gal drs	lb.	.05	.05¾	.05	.05¾	.05	.05¾
Dioxide, cyl	lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52½ gal. drms	lb.	.78	.80	.73	.80	.73	.80
Casein, Acid Precip, bgs, 100 or more	lb.	.22	.24	...	.24	...	.24
Chlorine, cyls, lcl, wks, contract	lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract	lb. *j*	...	.05¼	...	.05¼	...	.05¼
Liq, tk, wks, contract 100 lb.		...	1.75	...	1.75	...	1.75
Chloroform, tech, drs	lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude	bbl.	8.25	8.75	8.25	8.75	8.25	8.75
Cobalt, Acetate, bbl	lb.	...	.83¾	...	.83¾	...	.83¾
Oxide, black kgs	lb.	...	1.84	...	1.84	...	1.84
Copper, metal	100 lb.	12.00	12.50	12.00	12.50	12.00	12.50
Carbonate, 52-54%, bbls.	lb.	.19½	.20½	.19½	.20½	.19½	.20½
Sulfate, bgs, wks crypt.	100 lb.	5.00	5.50	5.00	5.50	5.00	5.50
Copperas, bulk, c-l, wks	ton	...	14.00	...	14.00	...	14.00
Cresol, USP, drs	lb.	.10¾	.11¾	.10¾	.11¾	.10¾	.11¾
Cyanamid, bgs	ton	1.52½	1.62½	1.52½	1.62½	1.52½	1.62½
Dibutylamine, c-l, drs, wks	lb.	...	.66	...	.61	...	.61
Dibutylphthalate, drs	lb.	.1900	.2359	.1780	.2659	.2060	.2300
Diethylaniline, lb drs	lb.	...	.40	...	.40	...	.40
Diethyleneglycol, drs, wks	lb.	.14	.15	.14	.15½	.14	.15½
Dimethylaniline, dms,cl..lcl	lb.	.21	.22	.21	.24	.23	.24
Dimethyl phthalate, drs	lb.	.1875	.1925	.1875	.1925	.1875	.2050
Dinitrobenzene, bbls	lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms	lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls	lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms	lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks	lb.	.16	.20	.16	.20	.15	.20
Diphenylamine bbls	lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs	lb.	.35	.37	...	.35	.35	.37
Ethyl Acetate, tks, frt all'd	lb.	.1070	.1175	.1070	.1175	.107	.110
Chloride, drs	lb.	.18	.20	.18	.20	.18	.20
Ethylene Dichloride, lcl. wks, E. Rockies, dms	lb.	.0842	.0941	.0842	.0941	...	.0842
Glycol, dms, cl.	lb.	...	.10	...	.10	...	.10
Fluorspar, No. 1, grd.95-98% bulk, cl-mines	ton	...	37.00	...	37.00	...	37.00
Formaldehyde, bbls, cl & lcl	lb.	.0520	.0570	.0520	.0570	.0550	.0575
Furfural tech, dms, c-l,wks	lb.	...	.13	...	.13	...	.12½
Fusel Oil, refd, dms, dlvd	lb.	.18½	.19½	.18½	.19½	.18½	.19½
Glauber's Salt, Cryst,c-l.,bgs, bbls. wks	100 lb.	1.05	1.45	1.05	1.25	1.05	1.25
Glycerin dynamite, dms, c-l,	lb.	...	.16½	...	.14½	...	.18¾
Crude Saponification, 80% to refiners tks	lbs.	...	.11½	.09½	.10	...	.12¾

GUMS

Gum Arabic, amber sorts bgs	lb.	.11¾	.12	.11¾	.14	.13½	.17½
Benzoin Sumatra, CS	lb.	.52	1.00	.52	1.00	.52	1.00
Copal, Congo	lb.	...	.55¾	...	.55¾	...	.55¾
Copal, East India, chips	lb.	...	.53¾	...	...	...	...
Macassar dust	lb.	...	.07⅜	...	.07⅜	.07⅜	.11¾
Copal Manila,		.13½	.15½	.13½	.15½	.13½	.15½
Copal Pontianak, bold c-l	lb.	...	.23⅜	...	.23⅜	...	.23⅜
Karaya, bbls, bxs, dms,	lb.	.15	.46	.15	.46	.14	.40

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

y Price given is per gal.

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FOR *Chemical* AND ALLIED INDUSTRIES

Easy to operate. No wear on valve mechanism. No metal parts contact pulp or liquid. No packing glands. Freezing temperatures will not destroy sleeves.

Cut Operating and Maintenance Costs

- Useful for solutions which are highly corrosive, or for solutions which crystalize at normal temperatures and must be handled at temperatures up to 300°F, or for mixtures of solutions or solids which are both corrosive and abrasive.
- Patented sleeve of valve made of rubber or synthetics to meet special requirements. The 1", 2" and 3" sizes are built for continuous pressure up to 100 lbs.; the 4", 6", 8", 10" and 12" sizes up to 150 lbs.
- Recommended for transfer lines, for controlling flow in plant and in delivering product to storage or cars. Also useful in handling fine, dry materials. *Valve shuts tight even on solid particles.* When writing, state your problem.

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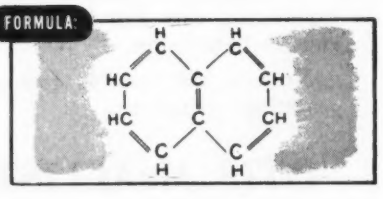
NAPHTHALENE

DEFINITION: A crystalline chemical compound of carbon and hydrogen found abundantly in coal-tar. It was early termed "tar camphor."

HISTORY: Naphthalene was discovered in coal-tar by Garden and Brande in 1819 and its chemical constitution determined by Michael Faraday in 1826. It was proposed for enriching water gas in 1862. Use for manufacture of naphthols for the synthetic dye industry commenced about 1873.

FORMULA:

$C_{10}H_8$



SOURCES: Traces of naphthalene occur in certain vegetable products. Some naphthalene has been recovered from specially processed petroleum fractions, but the principal source of naphthalene has always been coal-tar.

CHARACTERISTICS: Pure naphthalene is produced as white crystal flakes or chips which melt at 79.4° C or above. It boils at 218° C. It vaporizes slowly at room temperature. It has a clean penetrating odor; is soluble in benzene, hot alcohol and ether, but is practically insoluble in water. It burns with a smoky flame.

USES: Serves as a moth preventive and insecticide for household, institutional and agricultural use; as a raw material for phthalic anhydride, dyes, waxes, tanning agents, pharmaceuticals and plasticizers.

GRADES: Industrial: 74° and 78° crude in tank cars and barrels: 79.4° refined in tank cars and as chipped, crushed or flake in barrels and multi-walled bags. Household: flake and ball in 16-, 12-, 10-, 8-ounce packages; flake and ball, powdered or rice form, in barrels, bags and 50-pound bulk cases.

NOTE: Deliveries today are restricted by the primary requirements of naphthalene for war uses.

This is one of a series of advertisements presenting information on basic coal-tar chemicals.

Awarded to the men and women of the Barrett Frankford Chemicals plant for excellence in the production of war materials.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.

ONE OF AMERICA'S GREAT BASIC BUSINESSES

Current Prices

Gums
Salt Cake

		Current Market	1944 Low	1944 High	1943 Low	1943 High
Kauri, N. Y.						
Superior Pale XXX	lb.	...	.65¾	...	.65¾	...	.65¼
No. 3	lb.	...	.22	...	.23	...	.22
Sandarac, cs	lb.	...	.99½	...	.99½	1.40	nom.
Tragacanth, No. 1, cases	lb.	4.50	5.00	4.00	5.25	4.00	5.25
No. 3	lb.	2.25	2.50	1.10	3.50	1.10	1.20
Yacca, bgs	lb.	.06	.07¼	.06	.07¼	.06	.07¼
Hydrogen Peroxide, cbys	lb.	.15½	.18½	.15½	.18½	.15½	.18½
Iodine, Resublimed, jars	lb.	2.00	2.10	2.00	2.10	2.00	2.10
Lead Acetate, cryst, bbls	lb.	...	.12½	...	.12½	...	.12½
Arsenate basic, bg, lcl	lb.	.11½	.12	.11½	.12	.11½	.12
Nitrate, bbls	lb.	...	.12½	...	.12½	...	.12½
Red, dry, 95% Pb_3O_4 bbls.	lb.	.09	.10¾	.09	.11	.09	.11
97% Pb_3O_4, bbls delv	lb.	.09½	.11	.09¼	.11	.09¼	.11
98% Pb_3O_4, bbls delv	lb.	.09½	.11¼	.09½	.11¼	.09½	.11½
White, bbls	lb.	.08¼	.08¾	.08¼	.08¾	.08¼	.08¾
Basic sulfate, bbls, lcl	lb.	.07¼	.08	.07¼	.08	.07¼	.08
Lime, Chem., wks, bulk	ton	6.25	13.00	6.25	13.00	6.25	13.00
Hydrated, f.o.b. wks	ton	8.50	16.00	8.50	16.00	8.50	16.00
Litharge, coml, delv. bbls	lb.	.08	.09¾	.08	.09¾	.08	.09¾
Lithopone, ordi., bgs	lb.	.04¼	.04½	.04¼	.04¾	.04¼	.04¾
Magnesium Carb, tech, wks	lb.	.06¼	.09¾	.06¼	.09¾	.06¼	.09¼
Chloride flake, bbls, wks c-l	ton	...	32.00	...	32.00	...	32.00
Manganese, Chloride, Anhyd. bbls	lb.	.15	.18	.15	.18	.14	nom.
Dioxide, Caucasian bgs, lcl	ton	74.75	79.75	...	74.75	...	74.75
Methanol, pure, nat, drs gal	/	.63	.76	.63	.76	.63	.76
Synth, drs cl	gal. *m*	.31	.38	.31	.40½	.34½	.40½
Methyl Acetate, tech tks	lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv	lb.	.09½	.10½	.09½	.10½	.09½	.10½
Chloride, cyl	lb.	.32	.40	.32	.40	.31	.40
Ethyl Ketone,tks,frt all'd	lb.	...	.08	...	.08	...	.08
Naphtha, Solvent, tks	gal.	...	.27	...	.27	...	.27
Naphthalene, crude, 74°, wks tks	lb.	...	.0275	...	.0275	...	.0275
Nickel Salt, bbls, NY	lb.	.13	.13½	.13	.13½	.13	.13½
Nitre Cake, blk	ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, drs, wks	lb.	.08	.09	.08	.09	.08	.09
Orthonisidine, bbls	lb.	...	.70	...	.70	...	.70
Orthochlorophenol, drs	lb.	.25	.27	.25	.32	...	.32
Orthodichlorobenzene, drms	lb.	.07	.08	.07	.08	.07	.08
Orthonitrochlorobenzene, wks	lb.	.15	.18	.15	.18	.15	.18
Orthonitrotoluene, wks,dms	lb.	...	.09	...	.09	...	.09
Paraldehyde, 98%, wks lcl	lb.	...	.12	...	.12	...	.12
Chlorophenol, drs	lb.	.26½	.28	.25	.32	...	.32
Dichlorobenzene, wks	lb.	.11	.15	.11	.15	.11	.15
Formaldehyde, drs, wks	lb.	.21	.22	.23	.24	.23	.24
Nitroaniline, wks, kgs	lb.	.43	.45	.43	.45	.43	.45
Nitrochlorobenzene, wks	lb.	...	.15	...	.15	...	.15
Toluenesulfonamide, bbls	lb.	...	.70	...	.70	...	.70
Toluidine, bls, wks	lb.	...	.48	...	.48	...	.48
Penicillin, ampules per 100,000 units		.70	.95	1.10	4.50	...	...
Pentaerythritol, tech	lb.	.29	.33	.29	.33	.29	.35½

PETROLEUM SOLVENTS AND DILUENTS

Lacquer diluents, tks, East Coast	gal.	...	.11½	...	.11½	...	.11
Naphtha, V.M.P., East tks, wks	gal.	...	.11	...	.11	...	.11
Rubber solvents, East, tks, wks	gal.	...	.11	...	.11	...	.11
Stoddard Solvents, East, tks, wks	gal.	...	.10	...	.10	...	.09½
Phenol, U.S.P., drs	lb.	.10½	.11¼	.10½	.11¼	.10½	.13¼
Phthalic Anhydride, cl and lcl, wks	lb.	.13	.14	.13	.14	.13	.15½
Potash, Caustics, 88-92%, wks, sol.	lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06¾
flake, 88-92%	lb.	.07	.07½	.07	.07½	.07	.07½
liquid, 45% basis, tks	lb.	...	.02¾	...	.02¾	...	.0275
dms, wks	lb.	.03½	.03½	.03	.03½	.03	.03½
Carbonate, hydrated 83-85%	lb.	...	.05½	.05½	.05¼	.05½	.05¼
Chlorate crys, bgs, wks	lb.	.11	.13	.11	.13	.11	.13
Chloride, crys, tech, bgs, kgs	lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks	lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans	lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriate, dom, 60-62-63% K_2O bulk unit-ton	ton	...	.53½	...	.53½	.53½	.56
Permanganate, USP, wks dms	lb.	.20½	.21	.20½	.21	.20½	.21
Sulfate, 90%, basis, bgs	ton	...	36.25	...	36.25	...	36.25
Propane, group 3, tks	gal.	...	.03¾	...	.03¾	...	.03¾
Pyridine, ref., drms	lb.	.45	.45½	.45	.46	.45½	.46
R Salt, 250 lb bbls, wks	lb.	...	.65	...	.65	...	.65
Resorcinol, tech., drms, wks	lb.	.68	.75	.68	.75	.68	.75
Rochelle Salt, cryst	lb.	.43½	.47	.43½	.47	.43½	.47
Salt Cake, dom. blk wks	ton	...	15.00	...	15.00	...	15.00

/ Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices varying by zone.
* Spot price is ½c higher.

		Current Market	1944 Low	1944 High	1943 Low	1943 High
Saltpetre, grn, bbls	100 lb.	8.20	8.20	8.60	8.20	8.60
Shellac, Bone dry, bbls	lb. r	.42½	.42½	.46	.42½	.46
Silver Nitrate, 100 oz, bots	oz.	...	.32¾	...	.32¾	... .32¾
Soda Ash, 58% dense, bgs, c-l, wks	100 lb.	...	1.15	...	1.15	... 1.15
58% light, bgs cl	100 lb.	1.05	1.13	1.05	1.13	... 1.13
Caustic, 76% flake drms, cl	100 lb.	...	2.70	...	2.70	... 2.70
76% solid, drms,cl	100 lb.	...	2.30	...	2.30	... 2.30
Liquid, 47-49%, sellers, tks	100 lb.	...	1.95	...	1.95	... 1.95
Sodium Acetate, anhyd. dms	lb.	.08½	.10	.05	.10	.05 .06
Benzoate, USP dms	lb.	.46	.52	.46	.52	.46 .52
Bicarb, tech., bgs., cl., works	100 lb.	1.55	1.90	1.55	2.05	...
Bichromate, bgs.wks l.c.l.	lb.	.07⅞	.08½	.07⅞	.08½	... .07¾
Bisfite powd, bbls, wks	100 lb.	3.00	3.60	3.00	3.60	3.00 3.60
35° bbls., wks	100 lb.	1.40	1.65	1.40	1.65	1.40 1.65
Chlorate, kgs, wks c.l.	lb.	...	.06¼	...	.06¼	... .06¼
Cyanide, 96-98%, wks	lb.	.14½	.15	.14½	.15	.14½ .15
Fluoride, 95%, bbls, wks	lb.	.07¼	.08¼	.07¼	.08¼	.07¼ .08¼
Hyposulfite, cryst, bgs, cl, wks	100 lb.	...	2.25	...	2.25	... 2.25
Metasilicate, gran, bbl, wks c-l	lb.	...	2.50	...	2.50	... 2.50
Nitrate, imp, bgs	ton	...	33.00	...	33.00	... 33.00
Nitrite, 96-98% bbl. cl.	lb.	...	.06¾	...	.06¾	... .06¾
Phosphate, di anhyd. bgs, wks.	100 lb.	6.00	7.25	6.00	7.25	6.00 7.25
Tri-bgs, cryst, wks	100 lb.	2.70	3.40	2.70	3.40	2.70 3.45
Prussiate, yel, bbls. wks	lb.	...	.11	.10	.11	.10 .11
Silicate, 52°,drs. wks	100 lb.	1.40	1.80	1.40	1.80	1.40 1.80
40°, drs, wks, c-l	100 lb.	...	.80	...	.80	... .80
Silicofluoride, bbls NY	lb.	.06½	.10	.06½	.12	.05 .12
Sulfate tech. Anhyd, bgs	100 lb.	1.70	1.95	1.70	1.90	1.70 1.90
Sulfide, cryst c-l, bbls, wks	100 lb.	...	2.40	...	2.40	... 2.40
Solid, bbls, wks	lb.	3.15	3.90	3.15	3.90	3.15 3.90
Starch, Corn, Pearl, bgs	100 lb.	...	4.08	...	4.08	... 3.47
Potato, bgs, cl	lb.	...	.0637	...	.0637	... .0637
Rice, bgs	lb.	no stocks		no stocks		.09½ .10¼
Sweet Potato, bgs	100 lb.	.09	.09¼	.07½	.09¼	... .07½
Sulfur, crude, mines	ton	...	16.00	...	16.00	... 16.00
Flour, USP, precp, bbls, kgs	lb.	.18	.30	.18	.30	.18 .30
Roll, bbls	100 lb.	2.40	2.90	2.40	2.90	2.40 2.90
Sulfur Dioxide, liquid, cyl	lb.	.07	.08¼	.07	.09	.07 .08
tks, wks	lb.	...	.04	.04	.06	.04 .06
Talc, crude, c-l, NY	ton	...	13.00	...	13.00	... 13.00
Ref'd, c-l, NY	ton	13.00	21.00	13.00	21.00	13.00 21.00
Tin, crystals, bbls, wks	lb.	no stocks		no stocks		no stocks
Metal	lb.	...	.52	...	.52	... .52
Toluol, drs, wks	gal.	...	.33	...	.34½	... .33
tks, frt all'd	gal.	...	.28	...	.28	... .28
Tributyl Phosphate, dms lcl, frt all'd	lb.	...	.49	...	.49	... .47
Trichlorethylene, dms, wks	lb.	.08	.09	.08	.09	.08 .09
Tricresyl phosphate tks.	lb.	...	.24	...	.24	... ...
Triethylene glycol, dms	lb.	.18½	.19½	.18½	.26	... .26
Triphenyl Phos, bbls	lb.	.31	.32	.31	.32	.31 .32
Urea, pure, cases	lb.	...	.12	...	.12	... .12
Wax, Bayberry, bgs	lb.	no stocks		.25	nom.	.25 .26
Bees, bleached, cakes	lb.	...	.60	...	.60	... .60
Candelilla, bgs crude	ton	.35	.36	.34½	.48	.38 .48
Carnauba, No. 1, yellow, bgs, ton	lb.	...	.83¼	...	.83¼	... .83¼
Xylol, Indus. frt all'd, tks, wks	gal.	...	.27	...	.27	... .27
Zinc Chloride tech fused, wks	lb.	.05	.0535	.05	.0535	.05 .0535
Oxide, Amer, bgs, wks	lb.	.07¼	.07½	.07	.07½	.07 .07½
Sulfate, crys, bgs	100 lb.	3.40	4.15	3.40	4.35	3.60 4.35

Oils and Fats

Babassu, tks, futures	lb.	...	.111	...	.111	...	.111
Castor, No. 3, bbls	lb.	.13¾	.14¼	.13¾	.14¼	.13¾	.14¼
China Wood, drs, spot NY	lb.	.39	.41	.39	.41	...	.39
Coconut, edible, drs NY	lb.	...	.0985	...	.0985	...	.0985
Cod Newfoundland, dms	gal.	.85	.88	.85	.90	...	.90
Corn, crude, tks, wks	lb.	...	.12¾	...	.12¾	...	.12¾
Linseed, Raw, dms, c-l	lb.	...	.1550	.1510	.1560	...	.1530
Menhaden, tks	gal.	...	.1225	...	.1225	...	.1225
Light, pressed, drs l.c.l.	lb.	...	.1300	...	.1200	.1305	.1307
Palm, Niger, dms	lb.		.0865	..	.0865	...	.0865
Peanut, crude, tks, f.o.b. wks	lb.	.12⅞	.13⅞	.12⅞	.13⅞	...	.18
Perilla, crude dms. NY	lb.	no stocks		...	.245	...	.245
Rapeseed, New Orleans, bulks	lb.	...	.1156½	...	.1156½	...	.1150
Red, dms	lb.	.13¼	.14¼	.13¼	.14¼	...	...
Soy Bean, crude, tks, wks	lb.	...	.1175	...	.1175	...	.1175
Tallow, acidless, bbls	lb.	...	.14¼	...	.14¼	...	.14¼

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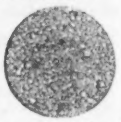

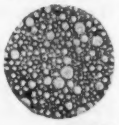

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1—10 gal. Bufflovac jac. Autoclave.

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1 — Practically new Hardinge Conical Mill for sale.

Box 1885

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1—42" dia. x 24'-4" Vertical, Forge Welded Steel, 600 lbs. Pressure—1300 gals.
1—4' x 6' Vertical, Iron Body, Steel Jacketed, 200 lbs. Pressure—600 gals.
1—6' x 15' Vertical Steel, Jacketed, 125 lbs. Pressure—3400 gals.
2—5' x 16' Horizontal, Steel, Jacketed, 300 lbs. Pressure—800 gals.
1—10' x 25' Vertical or Horizontal, Forge Welded Steel, Jacketed, 100 lbs. Pressure.

AGITATOR DRIVES

1—De Laval Type E Vertical Worm Gear. Ratio 70 to 1. 1200 R.P.M. Imput—10 H.P.
1—D.O. James—Size 1300 Vertical Worm Gear, Ratio 82 to 1, with base plate for 5 H.P. motor drive.
1—General Electric Vertical Gear Reduction Output Speed 5 R.P.M.—7½ H.P. G.E. Motor—Totally Enclosed—220 volts—3 phase—60 cycle.

CONDENSERS

1—Elliott Ehrhart Iron Body Surfmo Condenser—two pass 245 sq. ft. Surface—½" brass tubing and Tube sheet.
1—All copper condenser, Coil Type, 60 sq. ft. surface, removable from shell.

CRYSTALLIZERS

8—4' x 24' x 2'6" Deep Stainless Clad Steel, Jacketed—1800 gals.

DRYERS

3—Barlett & Snow Vertical Steel, Jacketed, 10' dia. x 4' high, Agitators, Reducers, 2 H.P. Motors.

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7—Burkhardt & Viersen, sizes 32" & 40" dia., bronze, rubber-covered and Lith-coated baskets.
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1—26" " "
1—20" " "
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1—24" dia. Cast Iron—40 Sections, each 6" high with dome and bottom sections—14 bubble caps per section.
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1—8' dia. x 10' deep, iron body with heating coil, agitator & drive, 3000 gals.
2—4' dia. x 4'6" deep iron body, anchor agitator and newport drive, 400 gals.
1—4' dia. x 4' deep iron body, agitator & drive, 400 gals.
1—3'6" dia. x 5' deep, steel jacketed, lead lined with agitator, 350 gals.
1—4'6" dia. x 5' deep, steel jacketed, with agitator and drive, 350 gals.
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PUMPS

2—Wilfley Model AB Centrifugal—7½ H.P. motor—one has stainless impeller & casing—2" inlet, 1½" discharge.
1—Shriver Diaphragm 3A—lead liquid ends, 90 gals., motor drive.
1—Shriver Diaphragm 3A—Rubber lined, 90 gals., motor chain drive.
4—Vacuum single phase stokes—size 8" x 6", pulley drive.
1—Quimby 4 stage Centrifugal, 500 gals.—75 H.P. G.E. motor.
1—American Well 2 stage Centrifugal, 350 gal. 30 H.P.G.E. motor, Magnetic Starter.
2—Gould Triplex Plunger—size 8" x 10"—400 gals. Pulley Drive.
1—Gould Triplex Plunger—size 3" x 4"—25 gals. V Belt Drive.
1—Quimby Screw Type—size 2"—5 G.P.M.—80' head—motor drive.

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3—Jeffrey 12 x 24 single deck VIBRATING SCREENS.

1—Battery of two 3 x 5 TYLER HUMMER SCREENS, 3-deck.

2—Fansteel Hydrochloric ACID ABSORPTION SYSTEMS.

1—Sturtevant Balanced ROLL CRUSHER, 30" x 16".

1—1,000 Gal. Duriron KETTLE.

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1 Kritzer Lime Hydrator, 6 cylinders, capac. 6 tons per hour.

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3-60-440 volt Motors and Starting Equipment will be included with all of the above machines.

This plant is still in operation, but will be shut down within the next few days.

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3—Sharples No. 6 Presurtite Centrifuges.

2—1200 gal. Steel, Jacketed, Closed Kettles

2—1750 gal. Lead Lined Pressure Tanks.

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$5000 New Steam Fittings

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Rendering equipment, formerly owned by Hien Bros. Soap Wks., Chicago.

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22—Pfaudler Sectional Glass-Lined & Mammut-Lined Storage Tanks, 3000-6000 gal. cap.

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2—Pfaudler Blue Glass-Lined Mixing Tanks, Jacketed 3 lb. Pressure, 300 gal. cap.

5—Pfaudler Reaction Kettles, 150-300 gal. cap.

1—J. H. Day Powder Mixer & Sifter, Size "B" —100 lb. Motor Driven.

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BUSINESS OPPORTUNITIES

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Well connected in this market with technical staff wants connection, with manufacturers of drugs and chemical products on representation basis. Detailed offers invited: May & Oppenheimer, Venezuela 720, Buenos Aires, Argentina.

HELP WANTED

PURCHASING AGENT WANTED

A leading Eastern manufacturer of Industrial Finishes — Lacquers, Synthetics, Varnishes, etc.—offers an excellent opportunity to a progressive man who has had purchasing experience, particularly in the chemical industry.

His position will be in the vicinity of Newark, New Jersey.

Send an outline of your experience, a photograph, and salary expectations to Box 2031, Chemical Industries, 522 Fifth Avenue, New York, New York.

All replies will be held confidential.

CHEMICAL MAN FOR EXPORT FIRM

Well-established export firm with substantial trade has opening for executive, experienced in chemicals, able to develop and handle a department. Export experience helpful but not absolutely necessary if proper chemical sales background. Salary plus participation in profits. Location away from New York. This is an exceptional offer. Submit complete details. All replies held strictly confidential. Box 2023.

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If so we have openings in our organization, an industrial chemical process industry.

Our company is an expanding chemical plant based on the Viscose process, with excellent post war possibilities.

The men needed should have production control and/or Design experience.

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Age Preferred—30 to 40

Salary—Depending on Qualifications.

Our organization is acquainted with this advertisement.

Write giving complete personal and technical history to Box 2015.

ASSISTANT PURCHASING AGENT, fully familiar pharmaceutical and allied chemicals, accustomed handling large volume details, production records, etc. State full particulars, age and salary expected. Box 2018

CHEMICAL SALES

Old established internationally known chemical manufacturer in Middlewest has positions in several Middlewestern areas offering security and opportunity. Men with scientific degrees preferred and with some experience contacting industrial and drug accounts. Write Box 2012 for further information, giving age and background.

Expanding Research Department of Manufacturer of packaging materials requires technical personnel. Positions open from section leaders to laboratory technicians. Work covers research as well as control and testing of many products, particularly synthetic resins. Location—attractive small community in Ohio. Please state qualifications, age, salary requirements and availability. Box 2024.

Long established well financed corporation wants pulpwood chemical engineer, experience preferred in wallboard research, who is capable of directing research control laboratory in utilization of wood waste: permanent position; our personnel advised of this ad; give full particulars; strict confidence respected. Box 2028.

CHEMIST

Progressive concern, located in the Middle West, has an opening for a chemist familiar with Sulphonated Oils, Tanners Oils and Greases, as well as Tanning Extracts. Permanent position with an excellent future. Send full particulars of past experience and salary expected. Box 2027.

SALES REPRESENTATIVE WANTED

A leading Eastern manufacturer of Industrial Finishes — Lacquers, Synthetics, Varnishes, etc. — offers an excellent opportunity to a young, progressive man who has had sales experience but not necessarily in this field.

He will be assigned to Chicago and surrounding territory.

In addition to a successful selling experience, the man who makes the connection must have a pleasing personality, good appearance, and ability.

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All replies will be held confidential.

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ABOUT THE AUTHORS

(*Continued from page 4*)

Rochester, N. Y., he worked on research and development of vacuum equipment and as an engineering consultant, with his efforts directed primarily towards the development, sales and service of high vacuum evaporation units.

Since 1944 he has served as group leader for a secret war research project. Mr. Anderson finds relaxation from his heavy "scientific" schedule by turning to a musical one, where he enjoys himself both as a singer and as a collector of string quartet recordings, particularly Mozart and Beethoven.

G. S. ORTNER and J. N. ROBINSON, authors of "Nitrogen Production from Nitric Acid Plant Tail Gas," page 80, are associated with Consolidated Mining and Smelting Company of Canada, Ltd., at Trail, B. C.

Born in London, England, Mr. Ortner came to Canada at an early age. He was graduated from the University of Alberta in 1928 with a B.S. in chemical engineering. The same year he joined C. M. & S. as an assayer. He was successively promoted to chief chemist of the chemical and fertilizer division, technical librarian, and research engineer. He is now superintendent of chemical research.

J. N. Robinson, who comes from Ontario, attended the University of Toronto, B.S. in chemical engineering. Shortly after graduation, he came to C. M. & S. as an assayer. Later he was attached to the ammonia division as plant tester and then shift boss. In 1941 he moved to the research department. At the present time he is chemical supervisor of the fertilizer and nitrate division.

NORMAN A. SHEPARD, who gives some pertinent advice on how to get cooperation between technical service and research, page 73, is so well known to most members of the chemical industry that he needs little introduction here. After studying and then teaching at Yale, Dr. Shepard went to the Firestone Tire & Rubber Co., where he was director of chemical research for 10 years. He is now chemical director of American Cyaramid Co. and was formerly director of technical service at Cyanamid's Stamford laboratory. Thus his experience particularly qualifies him to speak from both the research and technical service viewpoints.

Personnel Notes

(*Continued from page 148*)

W. B. SIPPEY has been appointed sales manager of the Columbia Cement Division at Zanesville, vice-president E. T. Asplundh of the Pittsburgh Plate Glass Co., has announced. CHESTER R. STEENBERG has been appointed assistant sales manager.

GEORGE W. GLEESON, Professor of Chemical Engineering and head of the Chemical Engineering Department at Oregon State College, who has also been acting dean of engineering for the past year, has now been appointed full dean of engineering.

BENJAMIN SWEEDLER, formerly in the patent division of Allied Chemical & Dye Corp. has opened a private office in the Graybar Building, Lexington Ave., New York.

GEORGE M. MOFFETT has been elected chairman of the board and MORRIS SAYRE, formerly executive vice-president, has been elected president (succeeding Mr. Moffett) for the Corn Products Refining Co.

H. G. BAKER has been appointed director of purchasing for the Radio Corporation of America, replacing F. D. Wilson, who is now director of personnel administration.

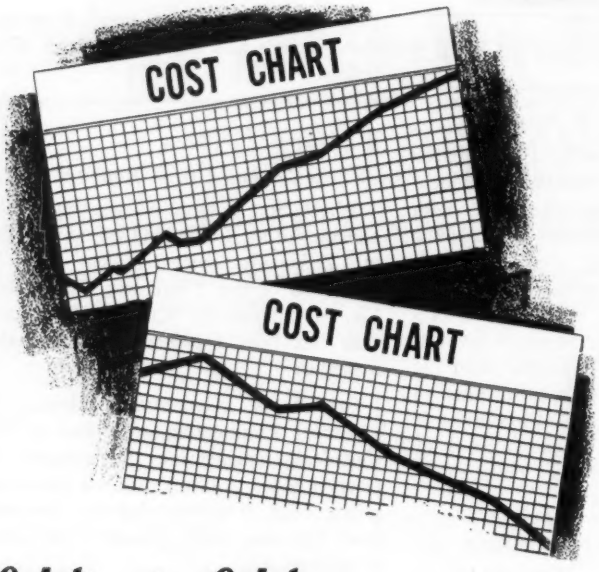
L. E. OSMER has been appointed sales manager of The Girdler Corporation's Gas Processes Division, according to W. R. Wood, vice-president. From 1930 until 1943, when he joined the Girdler Corp., he was Semet Solvay's district representative for the Midwest.

WESLEY A. JORDAN has recently joined the research staff of General Mills, Inc., where he will be associated with Mr. A. G. Hovey in the new chemicals development section of the research department. Mr. Jordan was formerly connected with the Sherwin-Williams Co. and since last July, served as head of the development department of Armour and Co.

STEPHEN A. LAURICH, formerly associated with Ferro Enamel Supply Co., has joined the staff of Battelle Institute, where he will be engaged in research in nonferrous metallurgy.

GERALD A. GRIFFITHS and GORDON A. SLEMIN, vice-presidents of National Drug and Chemical Co. of Canada, Ltd., have been elected directors of the company.

GUS WOHLFORT, credit manager, and DANIEL A. NEARY, have been advanced by Fritzsche Brothers, Inc., to the position of comptroller, and assistant secretary, respectively.



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"WE" – EDITORIALLY SPEAKING

OUR FAVORITE author of the month is George K. Scribner, president of the Boonton Molding Co. He writes about plastics in a delightfully entertaining style, an example of which is his definition of plastics: "It has reached the point where practically any synthetic organic material, which is not to be taken internally, is called a plastic, and even that limitation is not too sure. The trade watches the newspapers with fear and trepidation expecting at any moment that somebody will write an article about the new plastic capsules that can be swallowed and will automatically form new linings for some of the internal organs of the human being."

IT IS REFRESHING to find in these regulated days a bureaucrat who looks askance upon too much bureaucracy. Speaking of reconversion, J. A. Krug, head of WPB, had this to say:

"The danger confronting us, as I see it, is that we will overlook the natural resilience of the economy—the capacity of manufacturers, wholesalers, and retailers to re-adapt themselves to changed conditions and hence quickly to utilize the resources released from munitions production. If we were to attempt in Washington to see that every manufacturer, wholesaler, or retailer got his exact share of released manpower or materials, we should be lost in a myriad of rules and regulations. We should get in the way of reconversion rather than speed it."

THE *Wisconsin State Journal* urges the University to construct more buildings which we think is a Very Good Thing:

"A good scientist isn't going to work for long with only a 'microscope, a piece of string, and a jack knife' if there is opportunity to work in a well-equipped laboratory where his output may be increased manyfold. A Mark Hopkins isn't going to sit for long on an end of a log and teach if there are opportunities to teach in well-constructed classrooms with access to well-stocked libraries."

Fifteen Years Ago
From Our Files of July, 1930

Industrial Alcohol Bureau in the Treasury Department is organized by districts with headquarters in the following cities: Boston, New York, Philadelphia, Richmond, New Orleans, Cincinnati, Chicago, St. Paul, Denver, San Francisco, and Seattle.

Roessler and Hasslacher Chemical Co. holds annual sales and service convention at Niagara Falls, June 9-11.

National Fertilizer Association elects following officers at sixth annual convention held at Colorado Springs: president, L. W. Rowell; vice-president, Bayless W. Haynes; and executive secretary and treasurer, Charles J. Brand.

American Solvents & Chemical Corp., Rossville Commercial Alcohol Corp. and General Industrial Alcohol Corp. unit and will be conducted as a single entity.

Warren N. Watson is appointed secretary, Manufacturing Chemists' Association of the United States. Mr. Watson has been one of the staff of the chemical division of the Tariff Commission since 1919 and chief of the division since 1926.

Charles Allen Loring, secretary, North American Dye Corp., purchases substantial interest in Gilman Bros., Inc., wholesale druggists, Boston, Mass. and is elected vice-president and treasurer of the company.

Freeport Sulphur Co. conducts drilling tests for sulfur in Black Bayou section, Cameron Parish, La., under agreement with Shell Petroleum Corp., spending about $100,000 in initial work.

Mellon Institute of Research issue in book form series of eight radio talks on "Science in the Kitchen," discussing "a few of the most important engineering problems of the human machine."

General Aniline Works announces production of indanthran brilliant green 2GA paste fine and 4 GA paste fine.

Harshaw Chemical Co., Cleveland, Ohio, opens an office at 4008 Delmar Blvd., with Robert Galbraith in charge.

Graesser Monsanto Chemical Co., Ltd., London, is now making at its own Ruabon factory in North Wales, the range of rubber vulcanization accelerators, etc. which have been hitherto supplied by Rubber Research Laboratories, Akron, Ohio.

A PHENOMENON which has made itself increasingly evident during the war is the increased preoccupation of academic research with industrial problems. More and more universities are establishing foundations which tackle a steadily increasing volume of industrial research. Typical of these are the Ohio State University Research Foundation, the Division of Industrial Cooperation of M. I. T., the Harvard Graduate School of Business Administration, and scores of others.

Before the war there were probably less than a hundred universities doing industrial research; but by war end, there may be twice as many doing four times as much work.

It is usually stipulated that such work be "fundamental" rather than "applied" in nature, and should fit into the educational program of the institution. The school usually exercises a pretty free hand and reserves publication rights, but the rights of the sponsor are adequately covered by patents.

THE EDITORS of the *Del-Chem Bulletin* had this to say in their recent issue: "Our attention has been called to the fact that the February issue was practically a victory for the weaker sex."

They went on to point out that women wrote three of the articles.

Let us hasten to assure you that we are not throwing up our hands, or viewing with alarm, or yearning with nostalgia for the good ol' days. We're just noting a fact.

DR. I. T. SCHULTZ, psychology professor at Friends University (Wichita, Kansas) propounds a theory to explain the eagerly avowed (by Kansans) superiority of Kansans. The great plains soil, he says, is richer in calcium, phosphorus, magnesium, and other minerals. Food from this soil, he declares, improves the physique and makes for emotional stability.

ANOTHER NOTE on the value of research: Three-quarters of the plastics manufactured commercially by Du Pont's Plastics Department have emerged from the company's research laboratories within the past eight years.

PART 2: PATENTS AND TRADEMARKS

Abstracts of U. S. Chemical Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of patents are available from the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

From Official Gazette—Vol. 573, Nos. 3, 4—Vol. 574, Nos. 1, 2 (Apr. 17-May 8)—p. 585

*Equipment

Pressure operated tank unit for electric telemetric liquid level indicating system. No. 2,373,292. Bertil Clason to General Motors Corp.

Liquid-retaining tank comprising superimposed layers of bitumen-impregnated fibrous sheet material united together by interposed layers of hardened water-resistant composition containing magnesium oxychloride cement. No. 2,373,270. Max Skolnik.

Apparatus for treating a film of thermoplastic material, comprising a bath of cooling liquid, means for advancing the film, etc. No. 2,373,215. Harvey Young to The B. F. Goodrich Co.

Material distributing apparatus comprising linear conveyor for mass of loose fibrous material, a second, wider conveyor extending at angle to first conveyor and including unobstructed area to receive material swept from first conveyor, etc. No. 2,373,183. Louis Hawthorne to Johns-Manville Corp.

Liquid treatment apparatus, a tank, which is considerably wider than deep, flat bottom and vertical walls in said tank, a plurality of annular partitions concentric with said tank, each of said partitions upwardly extending from above said bottom through greatest part of depth of said tank, whereby there is formed in said tank an outermost downflow zone and a plurality of inner upflow zones. No. 2,373,154. Edward Welp to Graver Tank & Mfg Co., Inc.

Analyzing a mixture containing a plurality of components with respect to one component, which comprises ionizing a sample of said mixture at such predetermined ionization voltage that ions of a selected mass-to-charge ratio which may be formed from each of said components at some ionization voltage are actually formed from only said one component, ionizing at same voltage a reference sample containing a known amount of said one component, measuring amounts of said ions formed from both. No. 2,373,151. Daniel Tayler to Consolidated Engineering Corp.

Apparatus for detecting presence of one or more toxic gases in ambient atmosphere, in combination, a conduit supply means for introducing said atmosphere into apparatus, etc. No. 2,373,113. Oliver Francis.

Apparatus for detecting presence of one or more toxic gases in a gaseous medium, in combination, a closed container, compressor, etc. No. 2,373,112. Oliver Francis.

Liquid dividing means, comprising a spheroidal liquid receiving surface provided with projections adjacent thereto below said liquid receiving surface, etc. No. 2,373,099. Robert Burk to The Standard Oil Co.

Precision balance. No. 2,373,056. Jacob Emil Seederer.

Classifier of hindered settling type comprising a static cone with its apex downwards and its top open for overflow of finer fraction, etc. No. 2,373,051. John Phipps.

Carbon dioxide system for slow discharge into a fuel tank. No. 2,373,037. Charles Lindsay to American-La France-Foamite Corp.

Light polarizing image and process of manufacture comprising forming a sheet of a transparent plastic having long, oriented chain molecules and converting predetermined portions of said sheet to dichroic light-polarizing areas, the optical density of each of areas being a function of vibration direction of light incident thereon. No. 2,373,035. Edwin Land to Polaroid Corp.

Generator for automatic use and for decomposing water and segregating its component hydrogen and oxygen. No. 2,373,032. Bernard Klein.

Apparatus for producing fire extinguishing air foam under sufficient pressure to flow up a tall riser pipe. No. 2,373,009. Howard Bedford to Pyrene Development Corp.

Waste heat boiler having upper steam liberating drum and lower mud drum connected by heating surface elements enclosed within casing through which flue gas passes from lower inlet to upper outlet in said casing. No. 2,372,992. John Wallis and John Throckmorton to Petro-Chem Process Co., Inc.

Apparatus for heating fluids comprising a cylindrical combustion chamber, a heat source within said chamber, etc. No. 2,372,991. John Wallis and John Throckmorton to Petro-Chem Process Co., Inc.

Spinning bucket comprising acid-resistant resinous binder in combination with fabric filler comprising glass yarn running circumferentially through walls of bucket in direction of principal stress. No. 2,372,983. Henry Richardson to General Electric Co.

Apparatus for reclaiming condensate contaminated with chemically coagulated oil including a filter, a settling tank, etc. No. 2,372,952. Churchill Hungerford, Jr. to Hungerford & Terry, Inc.

Vessel for holding fluid under pressure. No. 2,372,800. Harry Stearns to Products Development, Inc.

Impregnating apparatus comprising a tank for holding a body of liquid impregnant, a work carrier, etc. No. 2,372,755. Walter Abell to United Shoe Machinery Corp.

Heat exchange apparatus comprising a fluid conduit, a heat exchanger device having surface thereof disposed in the conduit, etc. No. 2,372,675. Walter Keenan, Jr. and Nicholas Artsay to Foster Wheeler Corp.

Apparatus for delivering heavy liquids such as molten low melting point metal alloys, including hollow pressure resisting vessels, etc. No. 2,372,603. Francis Pilkington to Charles D. Holmes & Co. Ltd.

Gas comparison apparatus arranged for cyclic operation, comprising a metering network of the Wheatstone bridge type, etc. No. 2,372,530. Oscar Sommermeyer, Jr.

Multistage centrifugal separating apparatus for separating suspended material from stream of gas. No. 2,372,514. Peter Pootjes to Western Precipitation Corp.

Leak detector for electrolyte tanks. No. 2,372,489. Frederick Hampson to Plating Processes Corp.

Cathode for a cathode-ray tube, consisting of pure carbon support having depression therein and emissive material located in depression. No. 2,372,455. Andrew Stanier to Allen B. DuMont Laboratories, Inc.

Electron microanalyzer. No. 2,372,422. James Hillier to Radio Corp. of America.

Target for electrons having luminous surface adapted to be viewed from same side on which it is activated comprising supporting member, continuous light-colored reflecting member on supporting member, and coating of fluorescent material bound to reflecting member by binder comprising moist coating of an oxide of magnesium, aluminum or beryllium. No. 2,372,359. John Cook to Bell Telephone Laboratories, Inc.

Container having therein biologically-active substance which is adapted to be placed in usable condition by addition of water, which container has neck sealed by a perforable stopper through which water may be introduced and an extension beyond the neck. No. 2,372,352. Courtland Barr to Sharp & Dohme, Inc.

Electroplating apparatus. No. 2,372,297. James Saas.

Bearing formed of matrix of sinter-bonded metallic particles forming coherent pressure resisting structure, having base of cuprous metal and precipitation hardening ingredient. No. 2,372,202. Franz Hensel and Earl Larsen to P. R. Mallory & Co. Inc.

Container having neck sealed by a stopper and an extension beyond the neck. No. 2,372,182. Courtland Barr to Sharp & Dohme, Inc.

Container having neck sealed by a stopper and an extension beyond neck, the neck being adapted to be broken opposite stopper to enable the extension to be removed to provide access to stopper. No. 2,372,181. Courtland Barr to Sharp & Dohme, Inc.

Electron decelerator. No. 2,372,170. Richard Baker to Radio Corp. of America.

Device for measuring flow of fluid including, in combination with a motor driven indicator, a closed chamber through which the fluid is constrained to axially pass, pressure expansive means within said chamber, etc. No. 2,372,166. Madison McCarty.

Apparatus for coating metal strip with a layer of bakable coating material. No. 2,372,118. Thomas Radcliffe to General Electric Co.

Apparatus for testing abrasion and scrape resistance of applied electrically insulating coatings on wire or like. No. 2,372,093. Charles Leape and Gerald Haywood to Westinghouse Electric & Manufacturing Co.

Device for measuring vertical angular deviation. No. 2,372,091. Edwin Land to Polaroid Corp.

Bonded core comprising laminations of magnetic material bonded by a heat-treated insulating composition, composed of polyvinyl acetal, polyvinyl acetate for plasticizing composition and heat hardening phenol aldehyde type resinous condensate. No. 2,372,074. James Ford to Westinghouse Electric & Manufacturing Co.

Volumeter. No. 2,371,995. Donald Holmes and Lloyd Guild to Burrell Technical Supply Co.

Apparatus for melting loose mass of organic composition having a low thermal conductivity. No. 2,371,916. Wolf Rodenacker.

Device for mixing soluble chemical material with a liquid solvent, comprising a container, a conical foraminate wall dividing container into an upper material-containing chamber and a lower solution-receiving chamber, etc. No. 2,371,720. Carl Stine to Turco Products, Inc.

Electrical resistor comprising ceramic body of coherent non-porous structure, and having medium to low electrical resistivity and containing chromium titanate. No. 2,371,660. Eugene Wainer to The Titanium Alloy Manufacturing Co.

Fused joint of vacuum-tight seal between soft glass having a curved temperature-elongation characteristic and alloy consisting of nickel, chromium, and iron. No. 2,371,627. Walter Kingston to Sylvania Electric Products, Inc.

Instrument for investigating light refracting effect of liquid by observing reflection of light from interface of a solid and such liquid. No. 2,371,625. Samuel Jacobsohn to The Gaertner Scientific Corp.

Hydraulic sizer for suspended solids for association with a pool of suspended solids to be classified by hindered settling. No. 2,371,615. Edward Haagensen to The Dorr Co.

Optical element having refracting surface and reflection reducing coating thereon comprising evaporated and deposited calcium fluoride-aluminum fluoride eutectic. No. 2,371,611. Glenn Dimmick to Radio Corp. of America.

Thermometer having a case including a hollow concavo-convex base portion, etc. No. 2,371,603. Robert Bradley.

*Explosives

Removing liquid from discrete solid explosive material having interstices between discrete portions comprising placing column of said material upon and vertically above bed of material of greater capillarity. No. 2,373,100. Thomas Chapman.

High density explosive charge comprising a mixture of pentaerythritol tetranitrate and trinitrotoluene. No. 2,371,879. Clyde Davis and William Kirst to E. I. du Pont de Nemours & Co.

*Fine Chemicals

Making 3,4-xylidine which comprises catalytically hydrogenating a carboxylic acid ester of 2-methyl-5-nitrobenzyl alcohol. No. 2,373,438. Viktor Weinmayr to E. I. du Pont de Nemours & Co.

N,N'-bis (alkoxymethyl) ethyleneurea. No. 2,373,136. Fred Hoover and Gordon Vaala to E. I. du Pont de Nemours & Co.

3,17, 20-trihydroxy-pregnene. No. 2,372,440. Willy Logemann to Schering Corp.

Preparation of 2-ethyl-4-methyl-4-proprionoxymethyl-2-oxazoline, which

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* *Continued from Vol. 572, Nos. 3, 4; Vol. 573, Nos. 1, 2.*

comprises heating 2-proprionamido-2-methyl-1, 3-propanediol dipropionate to 245 C.° No. 2,372,410. Philip Tryon to Commercial Solvents Corp.

Diarylamino-trianthrimides. No. 2,372,313. Edwin Buxbaum to E. I. du Pont de Nemours & Co.

Alpha, alpha, beta trichloropropiophenone. No. 2,371,766. Joy Lichty to Wingfoot Corp.

Preparing a fluoro acetic acid which comprises reacting compound represented by CFaXCY=CYZ (in which each of Z, Y and X is one of group consisting of hydrogen, fluorine, and chlorine) with a permanganate in aqueous alkaline medium. No. 2,371,757. Albert Henne to E. I. du Pont de Nemours & Co.

Pyridine-3,4-dinitriles. No. 2,371,694. Richard Kuhn and Otto Westphal to Winthrop Chemical Co. Inc.

*Foods

Treating fish press liquor. No. 2,372,677. Sven Lassen, one-half to Phillip Park, Inc. and one-half to Van Camp Sea Food Co. Inc.

*Industrial Chemicals, Inorganic

Concentrating dilute sulfuric acid containing organic contaminants derived from olefin absorption processes. No. 2,373,359. Maarten Voogd, Frank Caddy and Charles Duffy to Shell Development Co.

Electrolytic reduction of aluminum bromide. No. 2,373,320. Wheeler Lovell and Nelson Phillips to General Motors Corp.

Precipitating alkali metal hydroxide which comprises treating aqueous sodium hydroxide with liquid ammonia and mixtures of liquid ammonia and water. No. 2,373,257. Irving Muskat to Pittsburgh Plate Glass Co.

Activated aluminum hydroxide including over one-third molécule of magnesium sulphate for each two atoms of aluminum, and an acid, present in quantity of two to three equivalents. No. 2,373,198. Victor Roehrich.

Manufacture of alkali metal hydride which comprises mixing a molten alkali metal with finely divided alkali metal hydride and compound selected from alkali metal hydrocarbides, etc. No. 2,372,671. Virgil Hansley to E. I. du Pont de Nemours & Co.

Manufacture of sodium hydride which comprises mixing molten sodium with finely divided sodium hydride and fatty acid compound selected from fatty acids and salts thereof and subjecting mixture to hydrogen. No. 2,372,670. Virgil Hansley to E. I. du Pont de Nemours & Co.

Reducing content of water-soluble acidic compounds in zinc oxide which comprises treating zinc oxide in thorough aqueous dispersion with ammonium hydroxide. No. 2,372,367. Harlan Depew to American Zinc, Lead & Smelting Co.

Producing pure metal hydride, which comprises heating hydride-forming metal contaminated with a metal impurity of lower boiling point in the absence of air, etc. No. 2,372,168. Peter Alexander to Metal Hydrides, Inc.

Preparing alkali metal thiocyanates. No. 2,372,119. George Riethof to Pittsburgh Coke & Iron Co.

Phosphor consisting of matrix of alkaline-earth-metal sulphide activated with europium in divalent state, and characterized by red to pink fluorescence under excitation with red afterglow. No. 2,372,071. Harry Fernberger to General Electric Co.

Production of mixtures comprising sulphur nitride and iminosulphur. No. 2,372,046. Michael Arnold to Imperial Chemical Industries Ltd.

Converting tin content of sodium fluostannate to stannous form, comprising bringing sodium fluostannate into contact with molten tin. No. 2,372,032. Donald Swalheim to E. I. du Pont de Nemours & Co.

Recovering bromine in elemental form from sea water. No. 2,371,886. John Grebe, William Bauman and Harold Robinson to The Dow Chemical Co.

Neutralizing harmful hydrogen fluoride content of aqueous solution of afluoride, which comprises adding to said solution sodium and calcium hydroxides, etc. No. 2,371,759. Robert King and James Word, Jr. and John Sims to Phillips Petroleum Co.

Nitrogen generating chemical which consists of thixotropic magnesium oxide gel containing ammonium nitrite in aqueous phase. No. 2,371,707. Edwin Rainier and David French to United States Rubber Co.

*Industrial Chemicals, Organic

Phosphite compound selected from esters and amides of hydroxyacetic acid. No. 2,373,627. Melvin Dietrich to E. I. du Pont de Nemours & Co.

Conversion of methyl formate to formic acid and methanol. No. 2,373,583. Donald Loder to E. I. du Pont de Nemours & Co.

Producing alkyl derivatives of aromatic hydrocarbon which comprises subjecting aromatic hydrocarbon to contact with alkyl fluoride in presence of hydrogen fluoride. No. 2,373,580. Carl Linn to Universal Oil Products Co.

Liquid phase process for hydrogenation of benzene to cyclohexane wherein benzene is continuously introduced into a reacton zone and reaction mixture is continuously discharged from that zone. No. 2,373,501. Merlin Peterson to E. I. du Pont de Nemours & Co.

Preparation of alkyl alkoxy acetate which comprises reacting an alkyl ether with formaldehyde and carbon monoxide in presence of an acidic catalyst. No. 2,373,483. Donald Loder to E. I. du Pont de Nemours & Co.

Preparation of an alkyl ester of methacrylic acid from a mixture of acetone cyanhydrin oleum and an aliphatic alcohol in presence of a polymerization inhibitor selected from hydroquinone and pyrogallol. No. 2,373,464. Harry Dittmar to E. I. du Pont de Nemours & Co.

Recovering isoprene and piperylene from hydrocarbon mixtures containing same. No. 2,373,329. Rupert Morris and Harry Finch to Shell Development Co.

Amide of benzylsulphonic acid and amino alcohol having replaceable hydrogen atom attached to nitrogen atom. No. 2,373,299. Gregg Dougherty and Robert Barth to Heyden Chemical Corp.

Derivatives of benzyl sulphonic acids. No. 2,373,298. Gregg Dougherty and Robert Barth to Heyden Chemical Corp.

Production of anhydrous acetone from a mixture containing acetone and water. No. 2,373,269. Russell Shiras and David Luckenbill to Shell Development Co.

Material having drying properties of drying oil and comprising ester of an amino hydroxy alkyl alkane containing two hydroxy groups and a free drying oil acid. No. 2,373,250. William Lycan and Joseph Eyre to Pittsburgh Plate Glass Co.

Production of desirable halogenated unsaturated and saturated oxygenated compounds, subjecting vapors of halogenated hydrocarbon containing olefinic linkage between two carbon atoms of aliphatic character to action of oxygen in presence of hydrogen bromide. No. 2,373,240. Harry Finch and Seaver Ballard to Shell Development Co.

Ester diamides. No. 2,373,230. Melvin DeGroote and Bernhard Keiser to Petrolite Corp. Ltd.

Drastically-oxidized hydroxyacetylated ricinoleic acid compound selected from castor oil, triricinolein, diricinolein, monoricinolein, super-glycerinated castor oil, castor oil estolides, polyricinoleic acid and ricinoleic acid. No. 2,373,228. Melvine DeGroote, Bernhard Keiser and Arthur Wirtel to Petrolite Corp. Ltd.

Manufacture of hydroxy alkyl amines. No. 2,373,199. Edward Schwoegler and John Olin to Sharples Chemicals, Inc.

Material subject to deteriorating effects of oxidative rancidity containing nordihydroguaiaretic acid as antioxidant, sometimes also known as beta, gamma-dimethyl-alpha, delta-bis (3,4-dihydroxyphenyl)butane. No. 2,373,192. Walter Lauer to the United States Secretary of Agriculture.

Producing alpha-beta unsaturated aliphatic acid nitrile which comprises dehydrating alpha-beta unsaturated aliphatic acid amide in vapor phase in presence of manganese oxide catalyst. No. 2,373,190. Frederick Kung to The B. F. Goodrich Co.

Separating butadiene from mixture of four-carbon hydrocarbons having constant boiling point and including butadiene, butylenes and butanes, which comprises extracting with a liquid butenol, and recovering enriched butadiene from butenol. No. 2,373,170. David Craig to The B. F. Goodrich Co.

Improving dehydration of 1,3-butylene glycol to produce 1,3-butadiene which comprises feeding glycol to chamber containing acid reacting dehydration catalyst and continuously introducing volatile basic material for contact with catalyst during reaction. No. 2,373,153. Richard Tollefson to Air Reduction Co. Inc.

A di-alpha-furyl ketone disulphonate. No. 2,373,152. Jack Thurston to American Cyanamid Co.

Preparing dihydrosapogenin compound, which comprises subjecting sapogenins, their side chain mono-chloro derivatives and their side chain mono- bromo derivatives to catalytic hydrogenation. No. 2,373,133. Russell Marker to Parke, Davis & Co.

Detecting presence of mustard gas in a gaseous mixture which comprises heating gas mixture to hydrolization temperature of mustard gas, passing into aqueous medium whose electrical conductivity is altered thereby. No. 2,373,111. Oliver Francis.

Production of monoethyl benzene. No. 2,373,062. Eldon Stahly to Standard Oil Development Co.

Stabilization of organic substance containing vanadium, manganese, cobalt, copper or their compounds, to catalyze oxidation of said organic substance, and having incorporation therein a metal deactivator to deactivate said catalyst, said metal deactivator being a thiourea. No. 2,373,049. Charles Pedersen to E. I. du Pont de Nemours & Co.

Continuous process for alkylating aromatics to produce mono-alkyl compounds, in which process there is tendency for poly-alkyl compounds to form. No. 2,373,031. Charles Kimberlin, Jr. to Standard Oil Development Co.

Production of mono-ethyl benzene which comprises reacting ethylene and benzene in presence of a catalyst comprising aluminum halide and a hydrogen halide. No. 2,373,030. Charles Kimberlin, Jr. to Standard Oil Development Co.

Malonic acid prepared by hydrolyzing malonic acid di-ester in presence of an acid-acting hydrolysis catalyst, carrying hydrolysis out in presence of an added agent selected from malonic acid and lower monoalkyl esters of malonic acid. No. 2,373,011. Edgar Britton and Ezra Monroe to The Dow Chemical Co.

Oxidation of organic compounds and manufacture of phthalic anhydride. No. 2,373,008. Sam Becker to Standard Oil Co.

Producing quinones. No. 2,373,003. Richard Arnold to Regents of the University of Minnesota.

Purification of technical acid precipitated casein containing impurities such as lactalbumin. No. 2,372,986. Luzius Schiebler to Society of Chemical Industry in Basle.

Manufacture of polynuclear carbonyl compounds and their enol esters, comprising heating glycols of cyclopentanopolyhydrophenanthrene series and their esters with metal selected from copper, zinc and cadmium. No. 2,372,841. Karl Miescher and Jules Heer to Ciba Pharmaceutical Products, Inc.

Thiocyano ether alcohols. No. 2,372,809. Herman Bruson to Rohm & Haas Co.

Esters of poly-beta-carboxyalkyl ethers of polyhydric alcohols. No. 2,372,808. Herman Bruson to The Resinous Products & Chemical Co.

Producing sulfonated fatty amide products which comprises heating substance selected from animal and vegetable sulfonated oils, fats, higher fatty acids and esters with ethanol ethylene diamine in presence of ammonium and amine salts of mineral acids as catalyst. No. 2,372,786. Maurice Kelley and William Abramowitz to National Oil Products Co.

Continuous process for production of benzoin from benzaldehyde. No. 2,372,709. Oliver Cass and Charles Bordner to E. I. du Pont de Nemours & Co.

Preparing aliphatic oxyamines. No. 2,372,624. Erwin Carpenter to American Cyanamid Co.

Producing mono-beta-ethers of styrene glycol comprising reacting styrene oxide with an alcohol. No. 2,372,615. Charles Thomas and Carroll Hochwalt to Monsanto Chemical Co.

Producing pentaerythritol by condensing acetaldehyde with formaldehyde in presence of alkaline condensing agent. No. 2,372,602. Grafton Owens to Monsanto Chemical Co.

Ethylene sulphide reaction products of guanidine. No. 2,372,598. Leonard Moore and Walter Ericks to American Cyanamid Co.

Reacting alphachloro-styrene with sulfuric acid. No. 2,372,562. William Emerson to Monsanto Chemical Co.

Producing pentaerythritol, after condensation of acetaldehyde with formaldehyde in presence of an alkaline catalyst, acidification of reaction mixture, and removal of metal ion of catalyst. No. 2,372,555. Richard Cox to Hercules Powder Co.

Separating acetaldehyde from mixture containing acetaldehyde and aldol which comprises subjecting mixture to action of steam diluted with inert gas to afford dew point between 60° and 80° C. No. 2,372,540. Frederick Balcar to Air Reduction Co. Inc.

Purifying styrene contained in light oil styrene fraction contaminated with phenyl acetylene. No. 2,372,528. Frank Soday to The United Gas Improvement Co.

Purifying ring substituted methyl styrene contained in light oil ring substituted methyl styrene fraction contaminated with methyl phenyl acetylene. No. 2,372,527. Frank Soday to The United Gas Improvement Co.

* *Continued from Vol. 572, Nos. 3, 4; Vol. 573, Nos. 1, 2.*

Recovery of purified styrene from light oil styrene fraction containing contamination in form of phenyl acetylene. No. 2,372,526. Frank Soday to The United Gas Improvement Co.

Purifying styrene contained in light oil styrene fraction contaminated with phenyl acetylene. No. 2,372,525. Frank Soday to The United Gas Improvement Co.

Purifying ring-substituted methyl styrene contained in light oil ring-substituted methyl styrene fraction contaminated with methyl phenyl acetylene. No. 2,372,524. Frank Soday to The United Gas Improvement Co.

Producing alkylated aromatics which comprises subjecting mixture of olefins and paraffins to reaction with liquid hydrogen fluoride. No. 2,372,505. Carl Linn to Universal Oil Products Co.

Preparing 2-oxazolines. No. 2,372,409. Philip Tryon to Commercial Solvents Corp.

Aryl polyglycol sulfonate. No. 2,372,365. Melvin DeGroote and Bernhard Keiser to Petrolite Corp. Ltd.

Diaryl substituted methane sulfonate, in which aryl radicals are monocyclic and sulfonic acid radical is nuclearly linked. No. 2,372,364. Melvin DeGroote and Bernhard Keiser to Petrolite Corp, Ltd.

Acyl phenyl dithiophosphoric acids and their preparation. No. 2,372,358. Elmer Cook and William Thomas, Jr. to American Cyanamid Co.

Subjecting normally gaseous hydrocarbon mixture which contains 5 per cent by volume of propane to cracking conditions to produce ethylene and olefin having more than two carbon atoms per molecule. No. 2,372,320. Frederick Frey to Phillips Petroleum Co.

Esters of acids of phosphorus. No. 2,372,244. Chester Adams and Bernard Shoemaker to Standard Oil Co.

Depolymerizing dicyclopentadiene which is free from materials boiling in neighborhood of cyclopentadiene, with large yield of pure cyclopentadiene. No. 2,372,237. Alger Ward to The United Gas Improvement Co.

Acetylating 2,3-butylene glycol with impure acetic acid obtained from pyrolytic decomposition of 2,3-butylene glycol diacetate to butadiene. No. 2,372,221. Samuel Morell to the United States of America, as represented by Claude R Wickard, Secretary of Agriculture.

Manufacture of combustible gas involving vapor phase pyrolysis of petroleum oil in heated petroleum oil pyrolyzing environment and in atmosphere of added benzene. No. 2,372,198. Edwin Hall and Harutyun Terzian to The United Gas Improvement Co.

Cyclic process for production of valuable hydrocarbons in a gas-making set wherein petroleum oil is pyrolyzed in vapor phase in a path of stored heat. No. 2,372,197. Edwin Hall to The United Gas Improvement Co.

Sulphurized N-(3-sulpholanyl) oleylamide. No. 2,372,161. Rupert Morris and John Van Winkle to Shell Development Co.

Sulphurized 3-sulpholanyl oleate. No. 2,372,160. Rupert Morris and John Van Winkle to Shell Development Co.

Making cochopherol-like chroman compounds. No. 2,372,132. Lee Smith and Henry Miller to Regents of the University of Minnesota.

Amino alcohol esters. No. 2,372,116. John Pierce, Jason Salsbury and James Fredericksen; said Salsbury and said Fredericksen to said Pierce.

Production of higher molecular weight polycarboxylic acids. No. 2,372,090. Edward Kirkpatrick to E. I. du Pont de Nemours & Co.

* *Continued from Vol. 572, Nos. 3, 4; Vol. 573, Nos. 1, 2.*

Manufacture of acrolein by gaseous phase catalytic condensation of aqueous formaldehyde with acetaldehyde. No. 2,372,031. Herbert Stanley and Wilfred Smart to The Distillers Co. Ltd.

Manufacture of hydrocarbons by heating carbonaceous material which comprises carrying out operation in presence of natural bleaching earth having composition of Degeendorf earth which has been treated with aqueous solution of a salt of a polyvalent metal. No. 2,371,890. Paul Herold and Hermann Kaufmann and Alfred Woerner.

Catalytic dehydrogenation of low-boiling aliphatic olefins having four carbon atoms per molecule to produce corresponding diolefins. No. 2,371,850. Walter Schulze and John Hillyer to Phillips Petroleum Co.

Polymerization of an aliphatic conjugated diolefin which comprises contacting diolefin with liquid addition compound of boron fluoride and aliphatic monohydric alcohol in presence of paraffin hydrocarbon as an inert diluent. No. 2,371,849. Walter Schulze and William Axe to Phillips Petroleum Co.

Production of butadiene from ethylene. No. 2,371,848. Walter Schulze to Phillips Petroleum Co.

Separation of low-boiling diolefin of four to five carbon atoms per molecule, produced by dehydrogenation of corresponding more saturated hydrocarbon, from accompanying dehydrogenation products. No. 2,371,817. Frederick Frey to Phillips Petroleum Co.

Catalytic dehydrogenation of paraffin hydrocarbons containing four to six carbon atoms to produce corresponding diolefins. No. 2,371,809. Harry Drennan to Phillips Petroleum Co.

Production of cyclopentene from cyclopentadiene without formation of cyclopentane. No. 2,371,794. James Boyd, Jr. to Phillips Petroleum Co.

Preparing copper quinolinate which comprises oxidizing quinoline with peroxide in presence of a lower aliphatic carboxylic acid and copper salt of a lower aliphatic carboxylic acid. No. 2,371,691. Alfred Hawkinson and Arthur Elston to E. I. du Pont de Nemours & Co .

Reacting pyrophoric nickel catalyst and organic compound containing a sulphone group. No. 2,371,642. Ralph Mozingo to Merck & Co. Inc.

Removing sulphoxy group from organic compounds that comprises reacting pyrophoric nickel catalyst and organic compound containing sulphoxide group. No. 2,371,641. Ralph Mozingo to Merck & Co. Inc.

Producing 1,3-butadiene from 1,3-butylene glycol. No. 2,371,634. Arthur Lorch to Air Reduction Co. Inc.

*Medicinals

Insulin suppository for rectal administration comprising insulin, a solid carrier, non-toxic and non-irritating weak organic acid, (lactic acid, citric acid and tartaric acid) and a non-haemolytic saponin surface tension reducing agent. No. 2,373,625. Benno Brahn to Rudolph de Villiers.

Hypodermic syringe. No. 2,373,520. Loren Wallin.

Preparing tetanus toxin which comprises incubating Clostridium tetani in a liquid peptone-containing medium in presence of activated charcoal. No. 2,373,454. William Bunney and Walter Koerber to E. R. Squibb & Sons.

Obtaining antihemorrhagic compound comprising treating compound of class consisting of vitamins K1 and K2 to reduce said compound to its hydroquinone form and to replace phenolic hydroxyl group of latter by group capable of hydrolysis to give a hydroxyl group. No. 2,373,105.

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THE RAYMOND BAG COMPANY, Middletown, O.

Edward Doisy and Donald MacCorquodale and Sidney Thayer, Stephen Binkley and Ralph McKee to President and Board of Trustees of St. Louis University.

Alkali and alkaline earth metal salts of 5,5-diphenyl-2,4-oxazolidinedione, prepared for use as therapeutics. No. 2,372,861. Roger Stoughton to Mallinckrodt Chemical Works.

Intermediates for production of vitamin B_6 and processes of preparing the same. No. 2,372,690. Eric Stiller to Merck & Co. Inc.

Derivative of the 2-alkyl-1,4-naphthoquinone showing in aqueous solution physiological effect of vitamin K. No. 2,372,655. Max Bockmuhl, Otto Schaumann and Erich Bartholomaus and Heinrich Leditschke to Winthrop Chemical Co. Inc.

Obtaining pure interstitial-cell stimulating hormone. No. 2,372,234. Harry van Dyke and Roy Greep and Bacon Chow to E. R. Squibb & Sons.

Obtaining beta-alanine which comprises adding excess of base to solution of a beta-alanine acid addition salt in a lower aliphatic alcohol. No. 2,372,092. Elmer Lawson and Hervey Parke to Parke, Davis & Co.

Coupled reaction product of a mammalian serum protein and a derivative of histamine. No. 2,372,066. Norbert Fell to Parke, Davis & Co.

Synthesis of pantothenic acid. No. 2,372,041. Dilworth Wooley to National Oil Products Co.

Therapeutically active solid, stable preparation in tablet form, consisting of compressed mixture containing dry water-soluble metallic acetate powder adapted to form aluminum subacetate when mixed with aluminum sulphate and water, dry crystalline aluminum sulphate in not-powdered form and binding agent. No. 2,371,862. Irving Wershaw to Dome Chemicals Inc.

*Metals, Alloys

Forming on surface of a body a thin metallic film with different areas having different light transmitting and reflecting characteristics which comprises subjecting surface to varying electrical discharge and depositing thin metallic film on areas in vacuo. No. 2,373,639. Arthur Turner to Bausch & Lomb Optical Co.

Inhibiting corrosion of metals in contact with alcoholic antifreeze solutions which comprises contacting metal with antifreeze composition containing an alcohol, borax and a mercaptobenzothiazole compound. No. 2,373,570. Edwin Keller to E. I. du Pont de Nemours & Co.

Removing iron impurity from melt of magnesium which comprises mixing melt with magnesium containing zirconium previously provided by reaction of zirconium chloride with magnesium. No. 2,373,516. Philip Stroup and George Sager to Aluminum Co. of America.

Removing iron from molten magnesium which consists in charging zirconium chloride into molten magnesium to cause precipitation of iron. No. 2,373,515. Philip Stroup and George Sager to Aluminum Co. of America.

Ferrous alloy consisting of chromium and nickel in amounts to produce stable austenitic alloy, carbon, molybdenum, tungsten and columbium and principally iron. No. 2,373,490. Gunther Mohling to Allegheny Ludlum Steel Corp.

Anodically polishing article having a surface of metal selected from zinc and alloys thereof containing more than 90% zinc, which comprises making article to anode in an aqueous solution comprising H_3PO_4, CrO_3, and water. No. 2,373,466. Charles Faust to Battelle Memorial Institute.

Producing visible paint-bonding coating upon a metal surface in less than one minute. No. 2,373,433. Robert Tanner to Parker Rust Proof Co.

Apparatus for rustproofing sheet metal. No. 2,373,432. Robert Tanner to Parker Rust-Proof Co.

Carburizing thin gauge armor plate. No. 2,373,369. Albert Abbott, Lester Spencer and Arthur Lichtenstein to Diebold, Inc.

Making bearing resistant to attack by acid products in lubricants which comprises forming backing member of hard and strong metal, securing to backing soft layer of metallic bearing material subject to corrosion, electrodepositing a thin coating of indium not greater than about .001", etc. No. 2,373,352. Clarence Smart to General Motors Corp.

Pickling bath for metals including pickling acid, and as an inhibitor, reaction product of an aminated chlorinated aliphatic hydrocarbon with sulfur in valence state less than six. No. 2,373,291. Charles Clark to The Mathieson Alkali Works, Inc.

Tipping a metal body which comprises fusing one end of said body by subjecting end to electric current discharge while submerged beneath surface of a depth of molten flux, immersing fused end of body in a bath of molten metal. No. 2,373,245. Robert Hopkins to The M. W. Kellogg Co.

Smelting iron in a blast furnace, which consists in charging thereto a bulk mixture of iron-bearing material of fine particle size, a sugary substance silicate of soda and water. No. 2,373,244. Frank Holz.

Powdered brass comprising particles consisting of core of brass of high zinc content and integral case of lower zinc content. No. 2,373,158. John Wulff.

Uniting two metal bodies by bonding metal wherein one of metal bodies is selected from silver, platinum, copper, gold, and nickel and wherein bonding metal is selected from lead, gold bismuth, silver and gold, and wherein each body has melting temperature higher than that of bonding metal. No. 2,373,117. Raymond Hobrock to Bundy Tubing Co.

Uniting two metal bodies, one of nickel, which comprises placing coating of copper on surface of one of bodies, etc. No. 2,373,116. Raymond Hobrock to Bundy Tubing Co.

Casting ingots of ferrous metal which comprises covering bottom of ingot mold cavity with lead and pouring molten ferrous metal directly on the lead. No. 2,373,036. Lewis Lindemuth to Steel Ingot Production, Inc.

Low melting point alloy soldering composition which consists of lead, tin, silver and antimony. No. 2,372,745. Albert Smith, Jr. to American Smelting & Refining Co.

Production of high speed steel powder for powder metallurgy. No. 2,372,696. Nils Tholand.

Device for discharging molten oxidizable metal into molds in succession from pot holding body of metal at pouring temperature by pumping molten metal therefrom through pipe to each mold and maintaining pipe filled with molten metal between pourings. No. 2,372,628. Clarence Logan and Philip Hartung to The Dow Chemical Co.

Manufacturing metallic magnesium from magnesium silicate ores. No. 2,372,571. Fritz Hansgirg to North Carolina Magnesium Development Corp.

Zinc base alloys having copper, aluminum, and arsenic or phosphorus, and zinc. No. 2,372,546. Edward Bunn to Revere Copper & Brass, Inc.

Electroplating process, the method of confining deposit of plate to localized area of the surface to be treated which consists in applying to localized area a weak adhering shield of colored material, etc. No. 2,372,488. Frederick Hampson to Plating Processes Corp.

Separating particles of abrasive material from particles of stainless steel which consists in heating mixture of such particles to oxidizing temperature and forming a magnetic coating on stainless steel particles. No. 2,372,321. William Griffiths to Allegheny Ludlum Steel Corp.

Sintered metal composition formed from nickel and cobalt, silicon, phosphorus, and copper, said composition containing silicide of nickel or cobalt as a dispersed phase therein importing strength and hardness thereto. No. 2,372,203. Franz Hensel and Earl Larsen to P. R. Mallory & Co. Inc.

Alloy consisting of manganese, iron, zinc, aluminum, and copper, being characterized by having specific ohmic resistance twenty-eight times that of copper and temperature coefficient of resistance of .000032. No. 2,372,152. Charles Whittaker and Walter Graham to Westinghouse Electric & Manufacturing Co.

Recovery of vanadium from petroleum oils. No. 2,372,109. Henry Noel to Standard Oil Development Co.

Manufacture of zinc compound which comprises electrolyzing with mercury cathode an impure zinc containing aqueous liquid, whereby impure, zinc-containing amalgam is obtained, subjecting amalgam to electrolysis to form a zinc compound. No. 2,371,829. Ernst Kuss and Hans Hohn.

Lead-coated steel which comprises coating ferrous metal surface with copper and bringing copper-coated surface into contact with molten lead in presence of molten sodium cyanide. No. 2,371,725. James Young to E. I. du Pont de Nemours & Co.

Producing classified iron powder which comprises forming white cast iron shot, disintegrating shot to powder to form carbon-rich and carbon-poor components and magnetically separating particles above Curie point of carbon-rich particles. No. 2,371,665. John Wulff.

Making cast iron castings, comprising selecting and melting mixture of ferrous materials to give a constitutional carbide wedge value. No. 2,371,654. Oliver Smalley and Herbert Reece.

Apparatus for changing chemical composition of finely divided ore by reaction with a fluid reagent. No. 2,371,619. James Hartley to Minerals and Metals Corp.

*Paints, Pigments

Preparing printing plates which comprises applying to sheet material, solution of tannic acid, applying an ink image on surface, said ink containing oleic acid, treating image with lithographic etching mixture which contains ferric chloride. No. 2,373,287. Ellis Bassist to William Toland, trustee.

Method for microscopically examining paint films consisting in forming film of dry paint on a microscopic slide, developing cellular structure of paint by immersing slide in a fluid similar to that in which paint is to be used. No. 2,373,104. Ferd Dieffenbach.

Printing composition comprising difficultly soluble ester salt of a leuco vat dyestuff; a salt of a primary to tertiary nitrogenous organic base, which contains ether-linked oxygen atom and, as solubilizing group, hydroxyalkyl group, with an unesterified organic acid selected from carboxylic acids containing not more than five carbon atoms in an open chain and aromatic amino-sulfonic acids; and a thickening agent. No. 2,372,370. Jacques Duport to Durand & Huguenin S. A.

Printing medium comprising carrier strip, coat of releasable material thereon, layer of mica powder thereon, and printing layer of color material and sizing thereon. No. 2,372,209. John Kohler to M. Swift & Sons, Inc.

*Paper and Pulp

Apparatus for pulping and screening papermaking materials. No. 2,371,837. Homer Martindale to The Black-Clawson Co.

*Petroleum Refinery

Stabilized aviation gasoline comprising normally stable gasoline type motor fuel containing tetraalkyl lead sufficient to render mixture unstable on storage and a stabilizing amount of compound selected from primary and secondary amino phenol hydroiodides and hydrobromides. No. 2,373,631. John Mital to Shell Development Co.

Catalytic alkylation of a low-boiling isoparaffin with a low-boiling olefin to produce gasoline hydrocarbons of high antiknock value. No. 2,373,612. LeRoy Story to The Texas Co.

Producing high quality liquid motor fuel, which comprises, commingling alcohol with a simultaneously dehydrating and polymerizing catalyst composed of tetraphosphoric acid. No. 2,373,475. James Jean.

Catalytic process and apparatus for cracking gas oil. No. 2,373,358. John Upham and I. Louis Wolk to Phillips Petroleum Co.

Purification of aviation oil in a liquid purifying system for ascending equipment designed to ascend and descend with said equipment. No. 2,373,350. Laurence Sharples to The Sharples Corp.

Pyrolytic process for converting aromatic hydrocarbons into alkyl substituted derivatives. No. 2,373,303. Frederick Frey and Jean Jones to Phillips Petroleum Co.

Converting paraffin hydrocarbon to other paraffinic hydrocarbons which includes, treating paraffin hydrocarbon with aluminum halide in presence of an aluminum alcoholate as a promoter. No. 2,373,295. Paul Cramer and Charles Begeman to General Motors Corp.

Reforming of naphtha fractions to increase octane number thereof which comprises contacting naphtha fraction in absence of added hydrogen with catalyst comprising dehydrogenating oxide deposited on refractory support. No. 2,373,254. William Mattox to Universal Oil Products Co.

Refining of hydrocarbon oils wherein oil is passed through treating zone containing a solid packing material and therein subjected to refining action of halide aluminum. No. 2,373,227. Joseph Danforth to Universal Oil Products Co.

Manufacturing aviation super-fuel. No. 2,373,101. Louis Clarke to The Texas Co.

Isomerization of normal paraffin hydrocarbons which comprises preparing concentrated liquid catalyst by reacting together an aluminum, a low halide, a low molecular weight paraffin hydrocarbon and a halogen. No. 2,373,063. Eldon Stahly and Louis Pirkle to Standard Oil Development Co.

Apparatus for heating hydrocarbons to conversion temperatures including a radiant heating chamber, a convection heating chamber, etc. No. 2,373,059. Brook Smith and John Donahue to Standard Oil Development Co.

In catalytic conversion system wherein a large bed of porous solid catalyst

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particles are retained in conversion chamber and chamber is depressured from high pressure to low pressure between on-stream periods, the method of preventing catalyst degradation, which comprises maintaining a time-pressure relationship during the depressuring step. No. 2,373,-043. Ivan Mayer to Pan American Refining Corp.

Petroleum hydrocarbons subject to deterioration caused by molecular oxygen, containing vanadium, manganese, iron, cobalt, copper and their compounds, effective to catalyze oxidation of hydrocarbons, and having incorporated metal deactivator to deactivate said catalyst said deactivator being a guanylguanidine compound. No. 2,373,021. Frederick Downing and Charles Pedersen to E. I. du Pont de Nemours & Co.

Removing weakly acidic bodies from hydrocarbon oils which comprises contacting oils with aqueous caustic alkali solution containing free alkali metal hydroxide, an amine which is compatible with solution and a solubility promoter for acidic bodies. No. 2,373,004. George Ayers, Jr. and Lawrence Henderson to The Pure Oil Co.

Separating mixture of isoprene and mono-olefins having boiling temperatures close to that of isoprene. No. 2,372,941. Theodore Evans, Rupert Morris and Edward Shokal to Shell Development Co.

Production of high octane number gasoline from hydrocarbon fraction having boiling range of 30° F. to 350° F. and containing open-chain paraffinic hydrocarbons. No. 2,372,711. Robert Cornforth to Standard Oil Co.

Separation of unsaturated aliphatic hydrocarbon by extracting hydrocarbon from stream containing same by means of furfural in an absorption zone, introducing furfural rich in hydrocarbon to a stripping zone, etc. No. 2,372,668. Karl Hachmuth to Phillips Petroleum Co.

Apparatus for cracking petroleum oil comprising a cylindrical vessel, etc. No. 2,372,591. Harald Lonngren.

Acid treatment of both straight run and cracked petroleum hydrocarbon oils, which comprises contacting straight run petroleum hydrocarbon oil with sulfuric acid. No. 2,372,441. Eddins McNealy to The Texas Co.

Conversion of hydrocarbons in presence of hydrogen fluoride catalyst wherein a hydrocarbon mixture containing dissolved hydrogen fluoride is separated from used catalyst containing hydrocarbon-fluorine complexes. No. 2,372,338. J. Robert Penisten to Universal Oil Products Co.

Separating butylene-2 from normally gaseous hydrocarbon mixture containing it and other less soluble olefins and paraffins which comprises subjecting mixture to contact with triethanol amine. No. 2,372,176. Charles Coghlan and Karl Korpi to The Texas Co.

Conversion of normally liquid hydrocarbon charging stock including light and heavy constituents into fraction boiling within gasoline range. No. 2,372,165. Maurice Arveson to Standard Oil Co.

Separating olefins from admixture with saturated hydrocarbons, which comprises scrubbing gas with solvent consisting of acetic acid, phenol and water. No. 2,372,085. William Jones and Charles Shewell to Standard Oil Development Co.

Simultaneously desulphurizing a sour hydrocarbon oil and raising its octane rating, which comprises contacting oil with catalyst which contains cuprous oxide and an oxide of a metal of VI group of periodic system. No. 2,372,084. Minor Jones to Standard Oil Development Co.

Manufacturing grease. No. 2,372,052. Alan Beerbower and John Zimmer to Standard Oil Development Co.

Conversion of high-boiling hydrocarbons into low-boiling hydrocarbons distilling within gasoline boiling range, wherein said high-boiling hydrocarbons are contacted with an alumina-silica cracking catalyst. No. 2,372,018. Robert Ruthruff to The M. W. Kellogg Co.

Cracking vapors of a heavy oil comprising diluting said vapors with lighter vaporous or gaseous non-aqueous diluent material. No. 2,371,-992. Emil Hene.

Separation of olefinic hydrocarbon from gaseous hydrocarbon mixture containing olefinic hydrocarbon and hydrocarbon which is more saturated than said olefinic hydrocarbons, which comprises, contacting gaseous hydrocarbon mixture with liquid selective solvent for olefinic hydrocarbon which consists of water and acetone or methyl ethyl ketone. No. 2,-371,908. Rupert Morris and Theodore Evans to Shell Development Co.

Removing methylacetylene from a C4 hydrocarbon which comprises fractionally distilling hydrocarbon containing methylacetylene in presence of propane and taking overhead C3 hydrocarbons including propane and methylacetylene. No. 2,371,860. William Walls and Maurice Dean to Phillips Petroleum Co.

Normally liquid Diesel engine lubricating oil comprising viscous mineral lubricating oil containing freely oil-soluble calcium soap of an organic acid having ten carbon atoms per molecule with a film-strength-increasing agent consisting of chlorine, the soap being present to overcome deposit of gummy and varnish-like materials in Diesel engines. No. 2,-371,763. Arthur Lazar, Paul Ruedrich and Raymond Frazier to Associated Oil Co.

Improving characteristics of olefinic gasoline which comprises desulfurizing olefinic gasoline in presence of a disulfurizing catalyst and subjecting resultant conversion products to an olefin isomerizing catalyst. No. 2,-371,726. Charles Alberding to Universal Oil Products Co.

Manufacture of combustible gas rich in methane and saturated and unsaturated normally liquid aromatic hydrocarbons and unsaturated hydrocarbons of 4 carbon atoms per molecule involving vapor phase pyrolysis of petroleum oil. No. 2,371,616. Edwin Hall to The United Gas Improvement Co.

Reactivation of highly active synthetic catalysts after use in promoting chemical reactions at low temperature. No. 2,371,610. James Daugherty, Jr. to Houdry Process Corp.

Conversion of heavy naphtha into high octane gasoline which comprises maintaining within conversion zone, admixture of hydrogen, naphtha vapors and a powdered hydroaromatization catalyst. No. 2,371,599. Maurice Arveson to Standard Oil Co.

*Photographic Chemical

Making planographic printing plates which comprises providing base element, applying coating of a polyvinyl alcohol, combining coating of polyvinyl alcohol with a photosensitive emulsion, etc. No. 2,373,357. William Toland and Ellis Bassist to William Toland, trustee.

Photographic structure that permits exposure of light-sensitive layer in contact with negative wet from acid-fixing solution, including transparent, waterproof, protective layer and soluble in alkaline photographic developing solution, said protective layer produced from a glycerol phthalate resin solution. No. 2,373,289. Robert Brown to Defender Photo Supply Co. Inc.

Photographic element which comprises transparent support, coating of a light-sensitive silver halide on one face and an anti-halation layer on other face of support, said anti-halation layer comprising a continuous film of a fraction of Yellow Gum Acroides, etc. No. 2,372,935. Kenneth Challis to Ilford Ltd.

Solution of gelatin containing a lower aliphatic nitroaldehyde, said solution adapted for production of hardening gelatin layer. No. 2,372,873. Robert Zappert to General Aniline & Film Corp.

Preparing engraved plate from a picture in which is used a transfer film including pellucid base sheet having thin pellucid bonding layer on one surface having particles of photo-sensitive silver halide dispersed therethrough. No. 2,371,773. Henry Neumann.

Photographic color correction process. No. 2,371,746. Ralph Evans and Wesley Hanson, Jr. to Eastman Kodak Co.

Negative photographic developer for reversal process containing developing agent and as silver halide solvent, an amine selected from primary and secondary alkyl, alkylene and allylamines. No. 2,371,740. LeRoy Dearing and Charles Guell to Eastman Kodak Co.

*Resins, Plastics

Production of mixed organic esters of cellulose of high clarity and possessing low residual acidity. No. 2,373,630. Mervin Martin and Troy Andrews to Celanese Corp. of America.

Treating liquid media to remove cations therefrom which comprises contacting media with cation-exchange material which is unfusible resinous reaction product of a phenol selected from phenol and meta-substituted phenols, nitrourea selected from nitrourea and monosubstituted nitrourea, and aldehyde. No. 2,373,549. Gaetano D'Alelio to General Electric Co.

Treating liquid media to remove cations therefrom which comprises contacting media with infusible, resinous cation-exchange body which is reaction product of a phenol, an aldehyde, and a partial amide of a polycarboxylic acid. No. 2,373,548. Gaetano D'Alelio to General Electric Co.

Treating liquid media to remove cations therefrom which comprises contacting media with infusible resinous cation-exchange body which is reaction product of a phenol, and aldehyde, and an aliphatic aminocarboxylic acid. No. 2,373,547. Gaetano D'Alelio to General Electric Co.

Producing bag-like deposit of rubber having a cohesive outer surface. No. 2,373,529. Carl Beal to American Anode, Inc.

Resinous composition comprising a polymerizable, decarboxylated, partially esterified alpha-unsaturated polycarboxylic acid. No. 2,373,527. Maynard Agens to General Electric Co.

Syrup for forming cast sheets between two glass plates separated by compressible gasket, said syrup consisting of methyl methacrylate and containing methacrylic acid. No. 2,373,488. Barnard Marks to E. I. du Pont de Nemours & Co.

Preparing bubble-free solid bodies from sirup of a polymer from esters of acrylic and methacrylic acids, dissolved in a monomer from esters of acrylic and methacrylic acids. No. 2,373,446. Daniel Beaton to E. I. du Pont de Nemours & Co.

Polymerizing acyclic terpene having three double bonds per molecule, which comprises contacting with metal halide catalyst capable of polymerizing terpene to a polymer containing about 70% of polymers higher than dimer. No. 2,373,419. Alfred Rummelsburg to Hercules Powder Co.

Thermosetting composition comprising a urea-formaldehyde reaction product and cinnamhydroxamic acid as a latent curing catalyst. No. 2,373,-362. Henry Walter to Libbey-Owens-Ford Glass Co.

Plasticizing gamma polyvinyl chloride which comprises agitating suspension of unplasticized polyvinyl chloride and plasticizer in water. No. 2,373,347. Frank Schoenfeld to The B. F. Goodrich Co.

Reaction product selected from monomers and polymers of acyclic terpenes having three double bonds per molecule, and an alkyl mercaptan. No. 2,373,343. Alfred Rummelsburg to Hercules Powder Co.

Degreasing apparent unsaturation of a modified rosin, containing 10% dihydroresin acids which comprises contacting rosin in absence of hydrogen with an organic sulfonic acid in presence of acid selected from formic acid and acetic acid. No. 2,373,290. William Campbell to Hercules Powder Co.

Sub-resinous ester. No. 2,373,229. Melvin DeGroote and Bernhard Keiser to Petrolite Corp. Ltd.

Air-blown heat reaction product of rosin modified alkyd resin and unblown drying oil. No. 2,373,212. William Waldie to New Wrinkle, Inc.

Condensation product of highly polymeric hydroxylated polymer with a monocyclic urea. No. 2,373,135. Robert Maxwell to E. I. du Pont de Nemours & Co.

To improve cracking resistance of solid, glassy, amorphous, thermoplastic polymer containing stores stresses which tend to crack the body. No. 2,373,093. William Baker to Bell Telephone Laboratories, Inc.

Synthetic resin comprising interpolymerized dimethallyl ether and a compound described. No. 2,373,067. Robert Thomas and William Sparks to Standard Oil Development Co.

Preparing phenol-aldehyde condensation products. No. 2,373,058. Samuel Silberkraus to Monsanto Chemical Co.

Producing high polymers, which comprises vulcanizing dihydric alcohol polyesters of polymeric acids derived from monomers containing unsaturated acyl radicals containing at least two double bonds. No. 2,373,-015. John Cowan and Waldo Ault to Claude R. Wickard, Secretary of Agriculture of the United States of America.

Plastic composition comprising cellulose mixed ester and plasticizer containing compound selected from p-tertiary butyl phenoxy ethanol, p-tertiary amyl phenoxy ethanol and p-tertiary butyl phenoxy ethyl acetate. No. 2,372,980. Frank Piech to Hercules Powder Co.

Polymer made from vinyl chloride, and a plasticizer. No. 2,372,947. Thomas Gresham to The B. F. Goodrich Co.

Preparation of novel condensation products, which comprises reacting castor oil with a non-hydroxy fatty acid and then reacting resulting product with an aliphatic polyamine. No. 2,372,797. Ernest Segessemann and William Abramowitz to National Oil Products Co.

Production of thermoplastic material in cellular form comprising malaxating a thermoplastic material with solvent to form a plastic composition. No. 2,372,695. William Taylor to Celanese Corp. of America.

Production of absorbent porous materials, which comprises adding to cellulose ester in finely divided form, liquid having swelling action thereon, etc. No. 2,372,669. Clifford Haney and Mervin Martin to Celanese Corp. of America.

Poly-carboxylic-acid-reacted sub-rubbery polymeric sulfur-converted polyhydric alcohol ester; said ester prior to sulfur-conversion containing unsaturated high molal detergent-forming monocarboxylic acid radicals.

* Continued from Vol. 572, Nos. 3, 4; Vol. 573, Nos. 1, 2.

No. 2,372,641. Gwynne Allen to Petrolite Corp. Ltd.

Manufacturing shaped article from high molecular weight synthetic linear polyamide which comprises disposing fused polyamine in a mold, solidifying polyamide by cooling it in mold within 10 seconds, and then heating article thus formed under anhydrous conditions until stiffness and hardness of article is increased. No. 2,372,630. Albert Smith to E. I. du Pont de Nemours & Co.

High viscosity cellulose proprionate and method of making. No. 2,372,565. Robert Fothergill to E. I. du Pont de Nemours & Co.

Plastic layer of safety glass structure comprising vinyl acetal resin having therein as plasticizer, neutral mixed esters of a fully esterified polyalkylene glycol with a mixture of caprylic and capric acids. No. 2,372,522. Frank Strauss to Wecoline Products, Inc.

Moldable plastics composition consisting of web-like body of comparatively long vegetable fibers having groups of fibers projecting therethrough and thermo-responsive resin binder. No. 2,372,433. Archie Koon to Columbian Rope Co.

Oxyalkylated derivative of a sub-rubbery polymeric sulfur-converted polyhydric alcohol ester; said ester having present, prior to sulfurization detergent-forming monocarboxy acid radicals, and each of acid radicals containing ethylene linkage. No. 2,372,366. Melvin DeGroote and Bernhard Keiser to Petrolite Corp. Ltd.

Removing cations from fluid media which comprises treating with an alpha-furyl substituted organic sulfonate reacted with and insolubilized by an aldehyde. No. 2,372,233. Jack Thurston to American Cyanamid Co.

Water-soluble urea-formaldehyde resin having admixed therewith a water insoluble hydroxy-stearic acid metallic soap. No. 2,372,178. John Corwin and William Moffitt to The Borden Co.

Molded member for refrigerators comprising cellulose acetobutyrate and substance selected from vanillin and coumarin. No. 2,372,153. Orland Yoxsimer to Westinghouse Electric & Manufacturing Co.

Preparing thixotropic dispersions of polymeric esters from corresponding monomeric esters from group consisting of methyl acrylate, ethyl acrylate, methyl methacrylate, ethyl methacrylate. No. 2,372,108. Harry Neher and William Conn to Rohm & Haas Co.

Molded laminated structure comprising glass fibers coated with amylaceous material, a coating of oil modified phenolic resin on glass fibers, and body of thermoset phenolic resin bonding whole. No. 2,372,048. Robert Auxier to Westinghouse Electric & Manufacturing Co.

Obtaining from solid and saturated ethylene polymer an unsaturated hydrocarbon product having % unsaturation of 25 and appearance and texture ranging from waxes to greases and of lower molecular weight than ethylene polymer. No. 2,372,001. Robert Joyce, Jr. to E. I. du Pont de Nemours & Co.

Obtaining resinous composition which comprises reacting in presence of water ingredients comprising urea and an aldehyde and the salt obtained from diamine and dibasic carboxylic acid. No. 2,371,997. Fred Hoover and Gordon Vaala to E. I. du Pont de Nemours & Co.

Polyester which on hydrolysis yields a saturated aliphatic monoaldehyde and a dicarboxylic acid. No. 2,371,990. William Hanford to E. I. du Pont de Nemours & Co.

Plastic comprising a polyvinyl acetal resin and, as modifying agent therefor, ethyl laurate. No. 2,371,957. Elmer Derby to Monsanto Chemical Co.

Resins obtained from a polyvinyl acetal and secondary diaryl amines. No. 2,371,943. Paul Austin to E. I. du Pont de Nemours & Co.

Producing resinous composition which comprises adding precipitated gelatinous hydrous metal oxide particles containing adsorbed water to a wet phenol-aldehyde resin, and then dehydrating. No. 2,371,915. Clinton Rector and Conrad Schrimpe to Bakelite Corp.

Preparing polymeric product which comprises heating adipic acid diamide with compound of general formula X-R-X, wherein R is aliphatic hydrocarbon and X is selected from chlorine, bromine and iodine. No. 2,371,869. Hans Bergk.

Producing porous polyvinyl chloride articles which comprises mixing particles of polyvinyl chloride with plasticizer which tends to dissolve polyvinyl chloride at elevated temperatures. No. 2,371,868. Herbert Berg and Martin Doriat.

Cellulose ester solution comprising cellulose ester and solvent therefor, said solution containing acid of phosphorus which has been partially neutralized by organic amine. No. 2,371,866. Gerald Barrett to Monsanto Chemical Co.

Preparing high butyryl cellulose esters stabilized against discoloration. No. 2,371,768. Carl Malm and Martin Salo to Eastman Kodak Co.

*Rubber

Aqueous dispersion containing quantities of a resilient solid high molecular weight polymerization product having paraffinic characteristics prepared by polymerizing a mono-olefin of low molecular weight; a tack-reducing copolymer of butadiene and acrylic nitrile; and a rubber material. No. 2,373,615. Andrew Szegvari and Adrian Feikert to American Anode, Inc.

Aqueous dispersion containing quantities of a resilient solid high molecular weight polymerization product having paraffinic characteristics prepared by polymerizing a mono-olefin of low molecular weight, shellac, and a rubber material. No. 2,373,614. Andrew Szegvari and Adrian Feikert to American Anode, Inc.

Aqueous dispersion containing quantities of materials including a phenol-aldehye resin; a resilient solid high molecular weight polymer of isobutylene and natural rubber. No. 2,373,613. Andrew Szegvari and Adrian Feikert to American Anode, Inc.

Tire having tread portion exhibiting resistance to heat build up caused by repeated flexures, said tread portion comprising vulcanized rubber composition containing polycyclic aromatic hydrocarbon. No. 2,373,599. John Rehner, Jr. to The B. F. Goodrich Co.

Increasing plasticity of unvulcanized rubber which comprises subjecting unvulcanized rubber in absence of sulfur to action of a compound described in patent. No. 2,373,375. Edward Blake to Monsanto Chemical Co.

Retarding deterioration of organic substance which tends to deteriorate by absorption of oxygen from air which comprises incorporating therein an aryl aminoaryl sulfonylamide. No. 2,373,335. Philip Paul to United States Rubber Co.

Increasing plasticity of rubber which comprises milling unvulcanized rubber in presence of salt of a pseudo-urea. No. 2,373,173. Russell Dean to American Cyanamid Co.

Vulcanizing a rubber which comprises heating a rubber and sulfur in presence of a compound. No. 2,372,895. Marion Harman to Monsanto Chemical Co.

Forming closed cell cellular expanded rubber comprising incorporating vulcanizing material in rubber mass; incorporating cotton yarn impregnated with sulphur chloride in regular arrangement in said mass; and impregnating rubber mass with externally applied gas under pressure. No. 2,372,793. Hans Pfleumer to Rubatex Products, Inc.

Reclaiming scrap containing vulcanized rubber which comprises heating the scrap in which has been incorporated a di (hydroxyaryl) sulphide. No. 2,372,584. Walter Kirby and Leo Steinle to United States Rubber Co.

Synthetic rubber composition consisting of copolymer of 1,3-butadiene and acrylonitrile and neutral oil resulting from treatment with a sodium hydroxide solution of resin formed by reaction of sulfur dioxide and 2-butene. No. 2,372,299. Robert Snow to Phillips Petroleum Co.

Inhibiting deterioration of rubber which comprises incorporating in rubber a secondary aromatic amine antioxidant and member of terpene mercaptans and metal terpene mercaptides in which metal is of group II-B. No. 2,372,235. John Vincent to E. I. du Pont de Nemours & Co.

Chlorinated rubber emulsion comprising solution of chlorinated rubber and a glycol ester of rosin acid. No. 2,371,899. Julius Little to Hercules Powder Co.

Plastic cyclized rubber composition which contains amide formed from acid of natural resin acids and hydrogenated natural resin acids and a dialkanol amine. No. 2,371,737. Clarence Carson to Wingfoot Corp.

Cyclized rubber and, as stabilizer, an amide of a polyalkylene polyamine and a carboxylic acid of class consisting of abietic acid, hydroabietic acid, and aliphatic monocarboxylic acids. No. 2,371,736. Clarence Carson to Wingfoot Corp.

Washing and drying coagula of rubber and similar materials, which comprises passing aqueous dispersion of vulcanizable material of chloroprene polymer into path of decreasing cross-section, simultaneously subjecting dispersion to coagulation conditions, etc. No. 2,371,722. Frederick Wanderer to E. I. du Pont de Nemours & Co.

Polymerizing chloroprene in presence of sulphur dioxide and product thereof. No. 2,371,719. Howard Starkweather to E. I. du Pont de Nemours & Co.

*Textiles

Thread of dry artificial silk resulting from drying thereof by heat produced internally of said thread uniformly throughout its entire length and cross section. No. 2,373,374. Rudolph Bierwirth to Radio Corp. of America.

Finishing fabric containing stretched thermoplastic fibers tending to shrink at elevated temperatures, pre-treating group of selected areas of said fabric to increase heat-susceptibility, and then applying heat to fabric to effect shrinkage in pre-treated areas. No. 2,373,195. Frederick Wedler to American Viscose Corp.

Production of mixed textile fibers including component consisting of fibers whose properties are modified upon treatment with chlorine, which comprises dyeing fibers of another component with dyestuff, sensitive to chlorine, and selected from direct dyeing dyestuffs, azo dyestuffs and sulfur dyestuffs, impregnating fibers of dyed part with insoluble coherent condensation product selected from melamine-formaldehyde condensation product, etc., working component parts into mixed fiber form, and then chlorinating mixed fibers, whereby properties of first-named component part are modified while dyed other component part remains unaffected. No. 2,373,191. Albert Landolt to Society of Chemical Industry in Basle.

Improving resistance to attack by boiling water or hot dilute acid of artificial threads having basis of casein or other protein and which have been partially hardened which comprises treating threads with aqueous solution containing formaldehyde and sulphuric acid. No. 2,372,622. Robert Wormell to Courtaulds Ltd.

Treating cotton cord which comprises placing cord under stretching tension, impregnating tensioned cord with a hot aqueous solution containing sucrose. No. 2,372,601. Ralph Nickerson to National Cotton Council of America.

Decolorizing lignified low rank textile fibre selected from jute, pita, and caroa. No. 2,372,561. Joseph Elgin.

Treatment of textiles, foils, films and like, which comprises acidylating them with retention of their structure by heating in non-solvent liquid medium comprising liquid organic non-solvent, a mixed dianhydride of a polycarboxylic acid and of a fatty acid and mixed anhydride of an aliphatic moncarboxylic acid and of a fatty acid. No. 2,372,386. Robert Moncrieff and Harold Bates to Celanese Corp. of America.

Binder and lubricant for glass fibre strands comprising dilute aqueous emulsion containing fatty acid sulphonate, gelatine, and emulsive substance selected from oils, fats and waxes as a lubricant. No. 2,371,933. Hans Steinbock.

Permanent finish for textiles which comprises mixture of alcohol-reacted melamine-aldehyde condensation product and a salt of an alkoxypropylamine. No. 2,371,892. John Hood to American Cyanamid Co.

Treated fabric comprising fabric which has been impregnated with copper salts of rosin and rosin oil, said rosin oil being obtained by destructive distillation of resin procured as a by-product in refining of FF wood rosin. No. 2,371,884. Frank Gardner to Hercules Powder Co.

Manufacture of alginate yarn consisting in spinning alginic solution into acid coagulating bath wherein is dispersed vegetable oil in emulsified form and thereafter collecting and drying yarn. No. 2,371,717. John Speakman to Cefoil Limited.

Protecting textile materials against attack by plant and animal parasites comprising dusting organic preservative and finely-divided solid thermoplastic vinylidene chloride resin product into and on the textile material, and applying pressure to bond the resin product and preservative to treated material. No. 2,371,618. Alden Hanson and William Goggin to The Dow Chemical Co.

*Water Sewage and Sanitation

Reducing fluorine content of fluorine-containing waters below toxic limit which comprises contacting water-insoluble anion exchange resin which has been impregnated with solution of an aluminum salt. No. 2,373,632. Robert Myers and Donald Herr to The Resinous Products & Chemical Co.

Additional patents on all other classifications from the above volumes will be given next month.

* *Continued from Vol. 572, Nos. 3, 4; Vol. 573, Nos. 1, 2.*

Abstracts of Foreign Patents

Collected from Original Sources and Edited

Those interested in obtaining further information concerning the patents reported below should communicate with the Patent Department, CHEMICAL INDUSTRIES. Photostated copies of Canadian patents are available from the Commissioner of Patents, Ottawa, Canada.

CANADIAN PATENTS

Granted and Published March 13, 1945 (Continued)

Brightening electro-plated tin coatings, by immersing in hot, 4 per cent reducing acid solution, to remove oxide film, rinsing, and subjecting to hot mineral oil bath to melt coating and provide mirror-like surface. No. 425,055. John S. Nachtman.

Polymerization of styrene in the presence of .001 to 5 per cent formaldehyde reactant, based on weight of crude, to produce high viscosity, tough, resins. No. 426,071. Allied Chemical and Dye Corp. assignee of the Barrett Co. (Allen R. Krotzer, Wilbert A. King, Julius H. Kleiner)

Tough, substantially colorless, polymerized para-methyl styrene resin, soluble in aromatic solvents, insoluble in alcohol, characterized by an absolute viscosity of at least 300 centipoises for 25 per cent solution in toluene at 25 Cent. No. 426,072. Allied Chemical & Dye Corp. assignee of Barrett Co. (Allen R. Krotzer, Wilbert A. King, Julius H. Kleiner)

Preparation of 3,4-dimethyl-aniline by selection of 4-bromo-orthoxylene and treating by ammonolysis. No. 426,077. American Home Products Co. (Walter A. Wissansky)

Process for extraction of gonad-stimulating hormone from pregnancy urine. No. 426,084. The British Drug Houses Ltd. (Philip Guy Marshall)

Vacuum gauge adaptable for determining degree of vacuum in can or receptacle. No. 426,085. British Food Manufacturers' Research Association (James Charles Morpeth)

Preparation for use in protection of steel for nitriding selected areas, composed of tin suspended in resinous solution. No. 426,092. Canadian Westinghouse Co. Ltd. (Walter C. Troy)

Liquid oral detergent comprising an aqueous solution of ammonium salts of the sulphates of coconut oil fatty acid glycerides, ammonium oleyl sulphate, glycerine, ethyl alcohol, sucrose, sodium chloride, and gum. No. 426,103. Colgate-Palmolive-Peet Co. (Robert Franklin Heald, Gergard Martin Salzmann)

Production of aqueous magnesium chloride liquors by carbonating slurries of mixed hydrates of magnesium and calcium in aqueous calcium chloride liquors containing soluble sulphates, wherein dolomite is calcined, ground, and added to the calcium chloride liquor. No. 426,104. The Consolidated Mining and Smelting Co. of Canada Ltd. (George Gerald Day)

Method of manufacturing high manganese base alloy, by casting, and rolling before it has cooled below 740 Cent., and quenching. No. 426,111. Electro Metallurgical Co. of Canada Ltd. (William Kroll)

Binding glass fibres, as spun at 5000 feet per minute, with fast-setting wax to form glass fibre strand. No. 426,112. Fiberglas Canada Ltd. (Allen L. Simison)

Gelatin capsulating apparatus, capable of forming multicellular gelatin capsules, and filling same. No. 426,115. Gelatin Products Company (Carl E. Mabbs)

Manufacture of alpha-(4-methyl-phenyl)-beta-methylamino-propane, by condensing 4-methyl benzylcyanide with ethyl acetate, saponifying, and subjecting resultant 4-methyl-phenyl-acetone to catalytic reduction in presence of methylamine. No. 426,119. Hoffman-La Roche Ltd. (Wilhelm Wenner)

Diaphragm apparatus for determining bursting strength of sheet materials. No. 426,120. The Institute of Paper Chemistry (James d'A. Clark)

Process for the preparation of pure pentaerythrite from raw crystillisate obtained by condensation of acetaldehyde and formaldehyde. No. 426,125. Lonza Elektrizitatswerke und Chemische Fabriken Aktiengesellschaft (Gampel) Basle (Gottfried Trumpler)

Insulating composition for electrical equipment comprised of naphthenic base mineral oil having dissolved therein a refined rosin, containing a minimum of residual terpenes and rosin oxide, and having substantially same optical activity as the impure colophony. No. 426,154. Archibald Walter Thompson & Dussek Brothers & Co. Ltd. (Archibald Walter Thompson)

Production of magnesium oxide of high chemical activity, by heat treatment of magnesium hydroxide or magnesium carbonate, of grain size below mesh 10,000 per sq. cm., at 800 to 1100 Cent., under stated conditions. No. 426,159. I. G. Farbenindustrie Aktienegesellschaft (Wilhelm Moschel, Willi Forst, Walter Schmid)

Heating vessel coated with thermally conductive layer composed of powdered iron, 150 grams; aluminum, 50 gms.; steel wool, 10 gms.; graphite, 10 gms.; silicate of soda, 150-200 gms., kaolin, 25 gms. No. 426,161. Auguste Albertini.

Granted and Published March 20, 1945

Material for removing milk stone from dairy equipment composed of dry silicic acid powder impregnated with orthophosphoric acid, in proportions so that water solution has pH of 1.5 to 3. No. 426,171. Carl Johnson

Method of separating organic compounds from a mixture, such as linoleic and oleic acids, by maintaining in a liquid condition, forming a water emulsion thereof, cooling to partial solidification, and making liquid solid separation. No. 426,178. August Henry Schutte.

Catalyst for polymerization of unsaturated hydrocarbons composed of silica gel impregnated with sulfur trioxide. No. 426,190. The Atlantic Refining Co. (Frank G. Ciapetta)

Method of manufacture of combustible element flash lamp. No. 426,197. Canadian General Electric Co. Ltd. (Walter J. Geiger, Wilson Davidson)

Manufacture of ornamental, open-work fabric, by interweaving insoluble textile fibres and soluble alginic fibres, and thereafter dissolving out alginic component. No. 426,236. Cefoil Ltd. (Arthur Johnson, John Bamber Speakman)

Purification of molten ferrosilicon, high in aluminum and calcium, by use of iron sulphide. No. 426,245. Electro Metallurgical Co. of Canada Ltd. (Joseph H. Brennan)

Manufacture of silica fibres by making alkali metal silicate glass, forming while plastic into fibres, acid treating to convert alkali metal to acid salt, washing, and heating at 1400-1500 Cent. to vitrify. No. 426,246. Fizerglas Canada Ltd. (Harrison P. Hood)

Method of protecting iron surface by treatment with water-soluble phenol-aldehyde reaction product of the class of hydroxybenzyl alcohols. No. 426,259. Minnesota Mining & Manufacturing Co. (Bert S. Cross, Howard B. Keene)

Glass-making batch for production of high silica, boro-silicate alkali glass, consisting of silica, feldspar and calcined borax, suitable for melting in an electric furnace with the production of little gas, and thereby seedless glass. No. 426,262. Newto Research Laboratories Inc. (Leonard H. Davis)

Method of manufacturing gas-expanded, closed cell, cellular rubber by use of diazoaminobenzene. No. 426,273. Rubatex Products Inc. (Robert Chas. Bascom)

Rectifier comprising base plate with layer of selenium, and counter-electrode comprised of layer of thallium applied to selenium layer. No. 426,278. The Union Switch and Signal Co. (Leslie Ernest Thompson, Alexander Jenkins)

Glass melting furnace design. No. 426,279. The United Glass Bottle Manufacturers Ltd. (Wm. Alfred Moorshead)

Thermal insulation, and method of manufacture thereof, composed of textile fabrics in which is retained insulating fibrous material. No. 426,288. Walter Garner and Lister & Company (Walter Garner)

Electron tube design. No. 426,291. C. Lorenz Aktienegesellschaft (Edmond Lupp)

Electric filter device design. No. 426,292. C. Lorenz Aktienegesellschaft (Wolfgang Hagen)

Granted and Published March 27, 1945

Method of treating iron and steel to coat with a uniformly adhering, perfectly bonded, smooth coating of tin, adapted to being drawn or formed without peeling, cracking, or separating from iron base. No. 426,314. John S. Nachtman.

Mixture to clear sewer pipes of obstructing roots, composed of caustic soda, 100 lbs.; copper sulphate, 8 lbs.; ammonium sulphate, ½ lb. No. 426,319. Arnold Chester Ripley.

Vat arrangement and apparatus for gluing paper strips. No. 426,332. Joseph Leo Surprenant.

Machine design for the production of wound paper tubes. No. 426,333. Joseph Leo Surprenant.

Method of recovering value from phosphate rock by subjecting aqueous pulp of phosphate-containing rock to froth flotation in presence of glyceryl monoricinoleate. No. 426,339. American Cyanamid Co. (Stephen Edward Erickson, David Walker Jayne, Jr.)

Packingless fluid valve control valve design. No. 426,348. The John Bertram & Sons Co. Ltd. (Max T. Knutzen)

Coating composition comprising methallyl acetate and partially polymerized diallyl phthalate. No. 426,356. Canadian General Electric Co. Ltd. (Gaetano F. D'Alelio)

Abrasive article, and method of manufacture thereof, composed of felted fibrous material, abrasive, and adhesive bond. No. 426,359. The Carborundum Co. (Albert Lloyd Ball, Raymond Calvin Benner)

Process of manufacturing granular colouring material by admixture of dye and molten wax at high temperature, and spray granulating. No. 426,366. Fred Frear & Co. (Benjamin D. Augenblick)

Radioactive nickel base alloy containing from one billionth to one hundredth per cent of metal from group consisting of polonium, radium, ionium, uranium II, protactinium, radiactinium, actinium X, radiothorium, and thorium X. No. 426,369. Firestone Tire & Rubber Co. (John Henry Dillond)

Preparation of beta hydroxy propionic acid lactone by reaction of gaseous ketene and formaldehyde, in presence of boron fluoride catalyst, at —20 to —60 Cent., and recovery by reduced pressure distillation. No. 426,376. B. F. Goodrich Company (Frederick E. Kung)

Rubber composition of improved tackiness, comprising rubbery butadiene-1,3 acrylonitrile copolymer tackified by addition of p-tertiary butyl catechol or dibutyl metal cresol. No. 426,377. B. F. Goodrich Co. (Charles F. Fryling)

Method of patching a blemished, unpolished, heat hardened urea-formaldehyde finish, by sanding, applying resin patch, and polishing so that joint is indistinguishable. No. 426,380. Interchemical Corporation (Ernest F. Fullam, Loy S. Engle)

Process comprising reacting methyl 3-methoxy cinchomeronic acid with diazo methane. No. 426,391. Merck & Co. (Eric T. Stiller)

(To be continued)

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

413,370. Rogers Isinglass and Glue Co., Gloucester, Mass.; filed July 20, 1944; Serial No. 472,435; for liquid fish glue; since November 1933.

413,516. Walgreen Co., Chicago, Ill.; filed Feb. 9, 1945; Serial No. 479,652; for chemicals; since 1916.

441,634. The Pure Oil Co., Chicago, Ill.; filed Mar. 17, 1941; for lubricating oil; since Nov. 1, 1926.

464,926. Pittsberg Chemical Co., Los Angeles, Calif.; filed Nov. 11, 1943; for fumigating compounds; since June 15, 1938.

466,921. Luckite Labs., Delawanna, N. J.; filed Jan. 27, 1944; for chemicals for treatment of cellulosic materials; since August 1943.

467,138. Savol Chemical Co. Inc., East Hartford, Conn.; filed Feb. 3, 1944; for ammonia and bleaching fluid; since Jan. 1, 1930.

467,240. The B. F. Goodrich Co., N. Y., and Akron, Ohio; filed Feb. 7, 1944; for adhesive cements; since Aug. 26, 1943.

468,237. The Firestone Tire & Rubber Co., as Firestone Industrial Products Co., Akron, Ohio; filed Mar. 13, 1944; for dispersions, emulsions, and latices of plastics; since Feb. 4, 1944.

468,238. The Firestone Tire & Rubber Co., as Firestone Industrial Products Co., Akron, Ohio; filed Mar. 13, 1944; for plastics; since Feb. 4, 1944.

470,540. Metalsalts Corp., Hackensack, N. J.; filed May 23, 1944; for salts derived from metals; since Apr. 26, 1944.

471,738. Fused Alloy Steel Products Co., N. Y.; filed June 28, 1944; for hardening steel; since Jan. 28, 1944.

472,735. The Eagle-Picher Lead Co., Cincinnati, Ohio; filed July 29, 1944; lead oxide and silica for ceramic glazes; since May 16, 1944.

472,959. Merck & Co. Inc., Rahway, N. J.; filed Aug. 4, 1944; for testing for acidity and alkalinity as with litmus paper; since Oct. 26, 1943.

474,894. The Goodyear Tire & Rubber Co., Akron, Ohio; filed Oct. 4, 1944; for accelerators for rubber; since Sept. 23, 1944.

475,350. Joseph L. Wenzel, as Wenzel Equipment Co., Kansas City, Mo.; filed Oct. 14, 1944; sensitized sheet material; since July 31, 1941.

475,666. Rohm & Haas Co., Philadelphia, Pa.; filed Oct. 24, 1944; for manufacture of hydraulic fluids; since Oct. 9, 1944.

476,348. Sure-Rite Products Co., Philadelphia, Pa.; filed Nov. 10, 1944; for lubricant oil; since June 1936.

476,704. Swift and Co., Chicago, Ill.; filed Nov. 20, 1944; for liquid glue; since Oct. 11, 1944.

477,072. Insta Chemical Co., Tulsa, Okla.; filed Nov. 30, 1944; for lubricant; since Nov. 20, 1943.

477,088. Anken Co., Newton, N. J.; filed Dec. 1, 1944; sensitized photographic paper; since Aug. 7, 1944.

477,257. Castyrone Mfg. Corp., N. Y.; filed Dec. 6, 1944; for brazing compound; since Sept. 22, 1944.

477,403. Arthur F. Christman, as A-C Model Co., Chicago, Ill.; filed Dec. 11, 1944; for adhesive cement; since Jan. 1, 1941.

477,615. Panef Mfg. Co., Milwaukee, Wis.; filed Dec. 15, 1944; for powdered lubricants; since Nov. 30, 1944.

477,618. Philadelphia Quartz Co., Philadelphia, Pa.; filed Dec. 15, 1944; for silicate of soda and of potash; since Apr. 10, 1930.

477,669. Shell Union Oil Corp., San Francisco, Calif.; filed Dec. 16, 1944; for inhibiting oxidation; since Nov. 15, 1944.

477,694. Heller, Leach, Preston & McCormick, Detroit, Mich.; filed Dec. 18, 1944; for cutting oils; since June 15, 1944.

477,790. Oil Trading Co., N. Y.; filed Dec. 20, 1944; for lubricating oils; since Dec. 8, 1944.

478,084. Robert H. Price, as Price Detergent Co., Shelton, Wash.; filed Dec. 30, 1944; for cleaning solvent; since Aug. 15, 1944.

478,192. Titanine, Inc., Union, N. J.; filed Jan. 3, 1945; for lacquer-like coating materials; since Dec. 20, 1944.

478,436. Radio Corp. of America, N. Y.; filed Jan. 9, 1945; for lubricating oil; since Sept. 1935.

478,515. The National Marking Machine Co., Cincinnati, Ohio; filed Jan. 11, 1945; for ink thinner; since Jan. 1, 1921.

478,516. The National Marking Machine Co., Cincinnati, Ohio; filed Jan. 11, 1945; for indelible ink; since Jan. 1, 1921.

478,555. Lehn & Fink Products Corp., Bloomfield, N. J.; filed Jan. 12, 1945; for insect repellent; since Nov. 24, 1944.

478,715. Monsanto Chemical Co., St. Louis, Mo.; filed Jan. 17, 1945; for synthetic resins; since Dec. 28, 1944.

478,716. Monsanto Chemical Co., St. Louis, Mo.; filed Jan. 17, 1945; for synthetic resins; since Dec. 28, 1944.

478,717. Monsanto Chemical Co., St. Louis, Mo.; filed Jan. 17, 1945; for synthetic resins; since Dec. 28, 1944.

478,909. L. Sonneborn Sons, Inc., N. Y.; filed Jan. 22, 1945; for textile wetting agent; since 1932.

478,952. The Dubois Co., Cincinnati, Ohio; filed Jan. 24, 1945; for anti-adhesive for rubber; since Apr. 17, 1939.

479,092. Protection Products Mfg. Co., Kalamazoo, Mich.; filed Jan. 27, 1945; for preserving wood for termites; since Sept. 1, 1944.

479,099. West Virginia Pulp & Paper Co., N. Y.; filed Jan. 27, 1945; for lignin; since Dec. 18, 1944.

479,114. The Dow Chemical Co., Midland, Mich.; filed Jan. 29, 1945; for perfume base; since Feb. 29, 1944.

479,365. Velso Products Co., Burlington, Iowa; filed Feb. 2, 1945; for soap impregnated paper; since Dec. 28, 1944.

479,386. G. M. Mfg. Co., N. Y.; filed Feb. 3, 1945; for lubricants for moulds; since Nov. 15, 1944.

479,398. Quaker Chemical Products Corp., Conshohocken, Pa.; filed Feb. 3, 1945; for solvent cleanser detergent; since August 1937.

479,554. Cordo Chemical Corp., Norwalk, Conn.; filed Feb. 8, 1945; for adhesives made of plastic resin; since Jan. 12, 1945.

480,209. L. Sonneborn Sons, Inc., N. Y.; filed Feb. 24, 1945; for asphalt emulsion for waterproofing; since 1926.

Trademarks reproduced and described include those appearing in Official Gazette of U. S. Patent Office, April 18 to May 8.

413,370

WALGREEN
413,516

MEDAL VALVE
441,634

464,926

LUCKITE
466,921

SAVOL
467,138

PLASTILOCK
467,240

VELATEX
468,237

VELEX
468,238

470,540

FUSE
A-LOY
471,738

ALSILOX
472,735

RUBIVERDIN
472,959

BILTAX
474,894

PHOTO-Script
475,350

PLEXOL
475,666

476,348

HIPPO
476,704

INSTA
477,072

477,088

CASTYRONE
477,257

A-C
477,403

Lub-a-Spray
477,615

477,618

IONOL
477,669

Clearlube
477,694

APOLLO
477,790

Solv-o-Soil
478,084

REGOfilm
478,192

478,436

Nat-Mar-Co.
478,515

PENETRO
478,516

BARRAGE
478,555

MULTIVIN
478,715

POLVATE
478,716

POLVIN
478,717

PENE QUIK
478,909

Latex Lube
478,952

WOODHEALTH
479,092

INDULIN
479,099

SYLVENOL
479,114

VERVTEX
479,365

MOULDLUBE
479,386

QUAKER-QUASOL
479,398

CORDO-TACK
#C
479,554

SONOMEND
480,209

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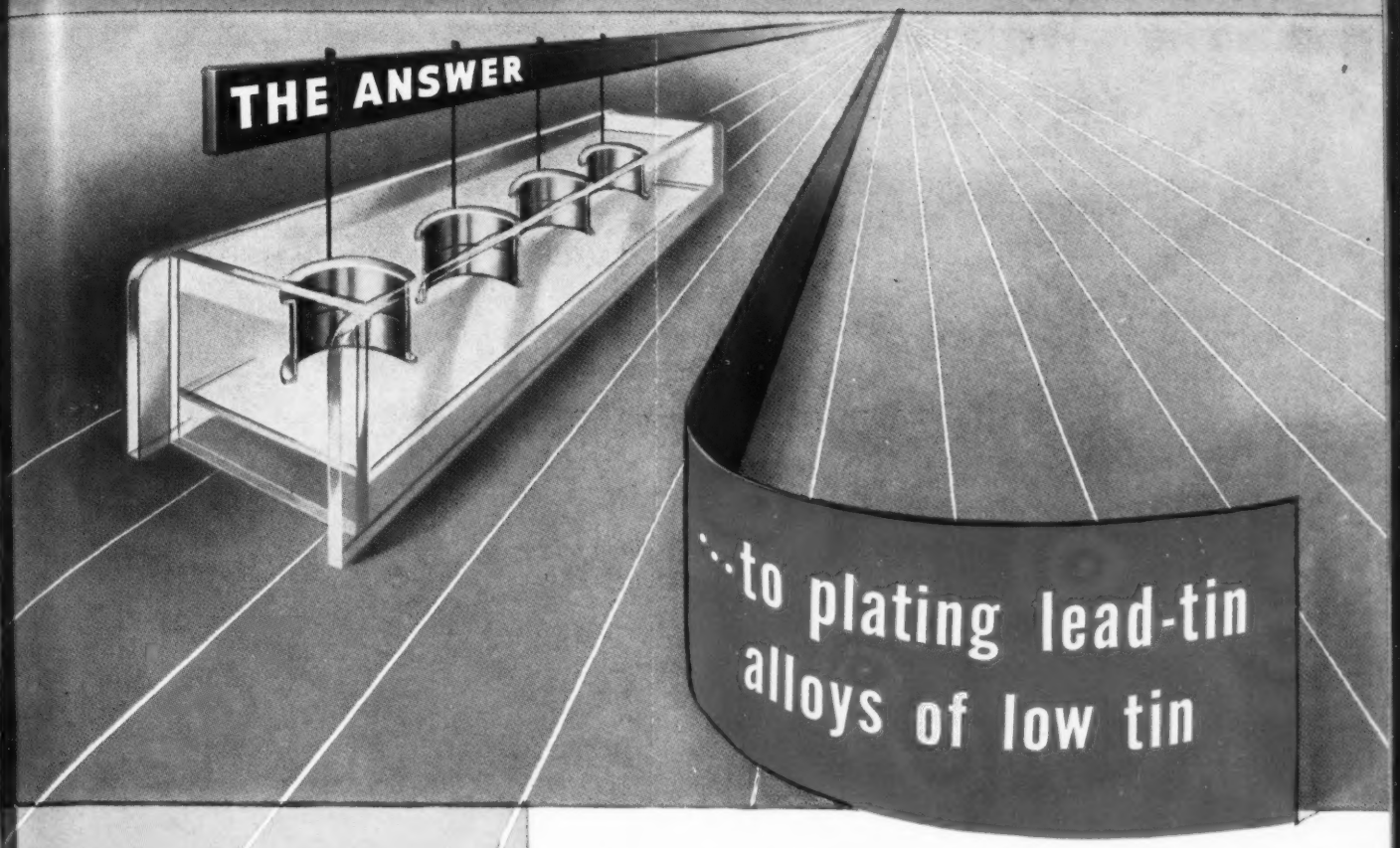

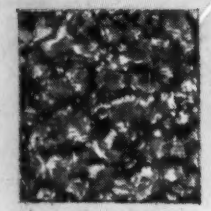

Fig. A: Lead Plating (100% Lead—0% Tin) *150 Diameters*

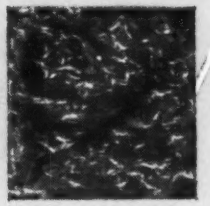

Fig. B: Lead-Tin Alloy Plating (91% Lead—9% Tin) *150 Diameters*

When tin is plated out simultaneously with lead from General Chemical Lead and Tin Fluoborate solutions, the lead-tin alloy plate obtained consists of a smooth, even cover in contrast to the grainy surface of the lead plate alone.

Fig. C: X-ray pattern of Lead Plating

Fig. D: X-ray pattern of Lead-Tin Alloy Plating (91% Lead—9% Tin)

Coarse grain spots in Fig. C coalesce in Fig. D to form more uniform lines, indicating finer grain structure. Only lead lines appear in both patterns since the tin atoms have entered the lead lattice to form an alloy in Fig. D.

For more than 25 years metal finishers have sought a successful means of plating lead-tin alloys in the low tin ranges. "Not feasible . . . inoperable . . . too many variables," read published reports on method after method.

Now—with the new chemical tools of General Chemical Fluorine Research—platers are achieving the "impossible."

Here's how: General Chemical *Lead* and *Tin Fluoborate solutions* are thoroughly compatible. Combined in baths using dual or alloy anodes, they plate out dense, fine-grained lead-tin alloy deposits . . . uniformly . . . simultaneously . . . and *with the tin easily controlled at low ranges!*

Thus, *in one operation* an alloy coating is produced that is harder, more wear-resistant, and has a more attractive appearance than lead plate alone. Little wonder that leaders in the bearing industry are adopting the combination fluoborate bath for lead-tin alloy plating of their products.

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